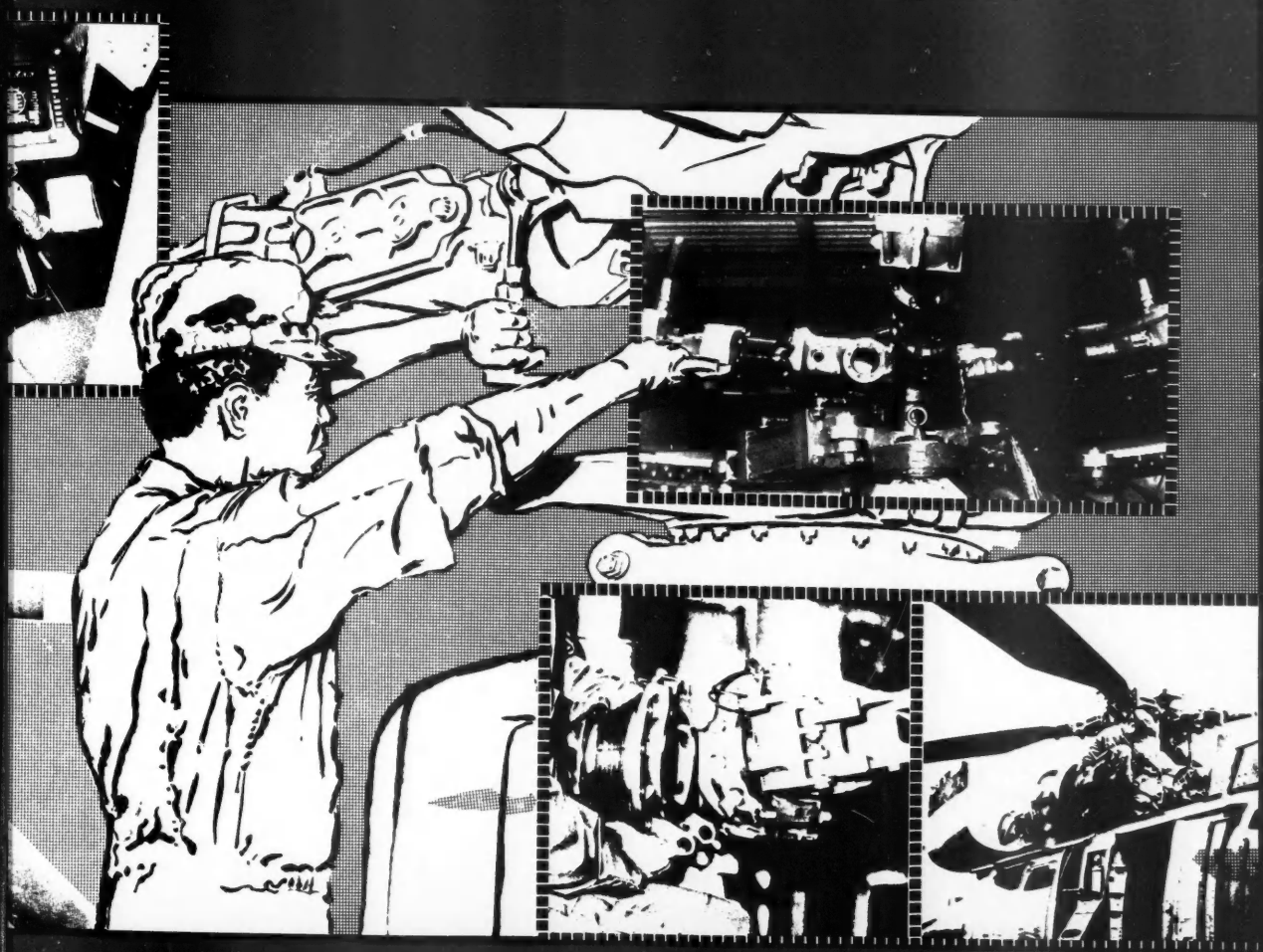
UNITED STATES ARMY

SEPTEMBER 1988

# AVIATION DIGEST



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Professional Bulletin 1-88-9

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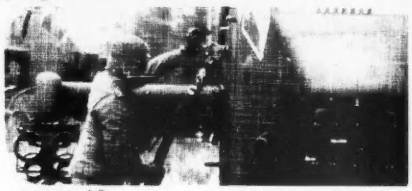

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*Cover:* **This month the *Aviation Digest* emphasizes the important role aircraft maintenance, battlefield repair and sustainability play in winning on the next AirLand Battlefield. In a two-part series, Part 1, in this issue, looks at "Choppers Grounded: The Supply-Demand Problem." Part 2 in the next issue outlines solutions to the problems.**


Major General Ellis D. Parker
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**Major General Ellis D. Parker**
Chief, Army Aviation Branch

# The UH-60 Multitrack Training Program

THE GOAL TO consistently graduate highly skilled aviators from our flight training programs is the mission of the Aviation Training Brigade (ATB) at the U.S. Army Aviation Center, Ft. Rucker, AL. Incorporating the multitrack program with its UH-1 Huey, OH-58 Kiowa, AH-1 Cobra and UH-60 Black Hawk tracks for the initial entry rotary wing (IERW) student into the ATB family has created several challenges for those units that previously taught only graduate flight courses. The AH-1 Cobra and UH-60 Black Hawk training companies are well on their way toward increasing their training mission to include multitrack. We've heard a lot about multitrack in previous issues of the *Aviation Digest*, but exactly what will each student in this program receive? Let's examine the UH-60 track as an example of the multitrack flow for a better understanding of this new Aviation Center mission.

Currently (fiscal year 1988), the UH-60 transition is available only as a graduate flight training program (aircraft qualification course (AQC)). Individuals selected to attend the AQC are rated aviators with various levels of aircraft experience. The course is 6 weeks in length and consists of transition-tactics training (Phase I) and night/night vision goggles (NVG) training (Phase II).

During Phase I, the student receives 25.5 hours (16.0 hours UH-60A and 9.0 hours UH-60 synthetic flight training system (SFTS)). In Phase II, the student receives 7.0 hours (4.5 hours NVG and 2.5 hours night in the UH-60A). Each student who completes the qualification program goes on to his or her next unit with only a limited amount of experience in the UH-60A.

Multitrack training begins for the IERW student after instrument training. The premise is to produce aviators from IERW who have trained in their specific combat aircraft during flight school, instead of tacking on an AQC program after the fact. Graduates from the Black Hawk multitrack program will receive more than twice the flight time currently allotted for the UH-60 AQC. This time will be broken down into four separate phases of training: transition, basic combat skills, night/NVG and advanced combat skills.

The transition phase is 20 training days and provides 18.4 hours in the UH-60A and 6.0 hours in the UH-60 SFTS. The transition phase establishes the foundation for additional training by teaching basic aircraft skills and maneuvers in the stagefield environment. Students complete a checkride during flight period 20 and move on to the basic combat skills.

Basic combat skills is also 4 weeks in length and provides multitrack students their first look at the types of missions they will be doing at their next assignment. Maneuvers include: Doppler navigation, confined area reconnaissance, terrain flight navigation and terrain flight mission planning. Scheduled flight time is 26.2 hours in the UH-60. The final flight period is scheduled for an end-of-stage evaluation before entering the night/NVG phase.

Twenty training days are scheduled during this phase; each student receives 8.8 hours of night flight in the UH-60A, 12.2 hours NVG and 4.5 hours in the UH-60 SFTS. The training is centered around the proper understanding and use of NVG in rotary wing aircraft. A qualification evaluation completes this phase.

The final phase of multitrack training in the UH-60 Black Hawk is the advanced combat skills phase. It is in this phase that the efforts and lessons learned in the previous 60 days are combined into 2 weeks of mission-oriented training. This consists of 11.9 hours in the aircraft and provides students the opportunity to plan and execute multiship cross-flot operations, using AirLand Battle doctrine. It also allows students the chance to use all the skills and maneuvers taught in the transition and basic combat skills phases. Aviation tactical exercises with students in the other tracks also are planned to use the full range of the multitrack concept before graduation from flight training.

The UH-60 multitrack flow begins in October 1988. It will be a positive, worthwhile addition to the flight training programs conducted at the Army Aviation Center. The end result will be the continued advancement of our mission to produce qualified aviators through new innovations in training and doctrine.

# CHO
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**The Army (the largest user), Navy and Air Force have adopted the UH-60, a high technology weapon system, to perform vital missions. In a scenario depicting a war in Europe in the 1990s, the author shows how shortages of this helicopter could occur, and the consequences resulting from such a shortage. Part 1 discusses the U.S., Allies and combat demands for helicopters; the production rate of the UH-60 to sustain these forces; and the problems with subcontractors and suppliers. Part 2, in the next issue, outlines solutions to the problems.**

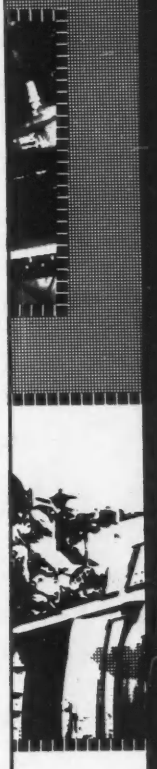
Colonel George Michael Mullen

# PPERS ROUNDED

## A European War Scenario for the 1990s

***The U.S. Army in Europe has long been comfortable with using helicopters in close combat. Despite its vulnerability to enemy fire and inability to be fully effective under conditions of reduced visibility, the helicopter is indispensable to Army leaders of the 1990s.***

***At the onset of conventional war in central Europe, North Atlantic Treaty Organization (NATO) forces are more effective than anticipated by prewar planners—they hold their own against probing, wide front, initial Soviet assaults. Attrition of men and materiel is high. The Allied Forces Central Region commander requests and receives approval to accelerate movement of critical combat items from U.S.-based reinforcing units. Among these supplies are UH-60 Black Hawk utility helicopters and flight crews. These crews and aircraft come from the most ready unit, the 101st Airborne Division (Air Assault).***



*Months before, as international tensions rose, Sikorsky Aircraft, a division of United Technologies, received contracts to double helicopter production rates on the last existing contracts and to meet anticipated demands of the war in Europe. The manufacturer, with plans already in-place to increase production, immediately places orders with its subcontractors. Unfortunately, the peacetime manufacturing process to produce helicopters takes more than 2 years, and the United States historically has taken 2 years to tool up additional production of complete weapon systems. Only those helicopters in the prewar funded production line can be accelerated. The war could be over before the first reinforcing UH-60s arrive in Europe.*

*At the onset of hostilities by Warsaw Pact nations in Europe, U.S. Allies and other free world countries see the danger to security, and immediately initiate plans for mobilization. The long-delayed worldwide provisioning for adequate defense results in an overwhelming demand for sophisticated weapon systems from the United States, the country with weapon systems available to meet the immediate needs for self-defense. The United States is tied to these countries through longstanding security arrangements and treaties. These agreements do not specify logistical and materiel support, but do attest to mutual concerns for the security of treaty nations.*

*The United States needs the support of well-equipped allied armed forces and the Allies need the support of the United States in their mobilization efforts. The level of threat determines the most pressing need. In the case of Japan, the least prepared of the Pacific powers, the immediate threat during a European war is Soviet submarine interdiction of Japanese sea lifelines. Japan's ambassador to the United States meets with the American Secretaries of State and Defense during the initial weeks of the European war to demand weapons, including antisubmarine helicopters, which he sees as absolutely essential if Japan is to protect its internal and external sea lanes.[1]*

*For its part, Japan will attempt to contain the Soviet Pacific fleet but the Japanese representative also requests additional artillery, vehicles, air defense weapons and Black Hawk helicopters for its ground forces.[2]*

*After heated debate within the Department of Defense (DOD) and the State Department, both Secretaries recommend to the President that the United States honor its moral obligations to Japan and provide the high-technology systems demanded.[3] Forty SH-60B Light Airborne Multipurpose System (LAMPS) III antisubmarine helicopters and 25 H-60A Black Hawk utility helicopters are shipped to Japan, along with other equipment required to strengthen its defense forces.*

*To meet the needs of the U.S. Navy, the Secretary of Defense gives priority to the production of Seahawk helicopters. Sikorsky's production facilities cannot immediately meet the increase. On the authorization of the Secretary of Defense, Sikorsky devotes its entire resources to the production of Seahawks. Parts and components needed for the Seahawks are taken from the Army's primary utility helicopters still on the production line. Production of Army Black Hawks is stopped, awaiting critical parts. Additional Army helicopters become "not-mission-capable" because of parts shortages.[4]*

*Without a full complement of Black Hawks, commanders in the European theater soon feel constraints on their operations. The tempo of U.S. ground operations noticeably slows as the reluctance to use an irreplaceable weapon system permeates the command.*

*The Soviets, noticing the hesitation in U.S. ground mobility, press their newly founded advantage; they attack the weakened NATO units—all are without sufficient replacements to cover combat attrition.*

footnotes on page 5

# CHOPPERS GROUNDED

## Part 1: The Supply-Demand Problem

This article is adapted from a national security essay published in February 1988, by the National Defense University. The *Aviation Digest* thanks the National Defense University and the author for permission to reprint this essay. The opinions expressed are those of the author and do not necessarily reflect the views of any Department of Defense agency.

In the preceding scenario, U.S. demands for equipment could not be met. Additional demands from underdefended Allies resulted in multiplying the demand that, when filled, sealed the fate of the U.S. Army in Europe. The results predicted by mobilization exercises in the late 1970s and early 1980s were validated in the 1990s.

**Demand for Helicopters**

The utility helicopter played a critical role in the preceding scenario; the helicopter is one of many high-technology devices on which the Armed Forces depend. The unique vertical takeoff, landing and hover capabilities of the helicopter give great tactical mobility to the military commander, because the aircraft is not constrained by terrain. The United States is the free world's primary user of military helicopters, with more than 8,000 in the Army, 400 in the Navy and some 300 in the Air Force. The helicopter proved to be a significant force multiplier in combat during the Korean and Vietnam wars. Its special capabilities make it indispensable for certain missions; without an available helicopter, the mission usually isn't undertaken.

Helicopters, however, are expensive high-technology weapon systems that are not purchased in the same relative numbers by other armed forces of the free world. Japan's self-defense forces, for example, have a total of 545 helicopters of 9 different types.[5]

Only the Soviets have put aside affordability to maintain a larger fleet of combat helicopters. The national priorities of most countries currently do not allow for the purchase of helicopters to meet modern military requirements. And, in the case of many nations, only small purchases of any defense items are allowed. But a pent-up demand still remains for these machines, and this demand will be realized when the national security of these nations is threatened.

The demand for H-60s will be considered from the view of our own forces. Potential demand by our Allies for H-60 helicopters is difficult to define. But since the H-60 fills a critical need for the U.S. military, an additional demand is likely for this important weapon system to meet the need for tactical mobility. The needs of U.S. Allies cannot be met from available inventories, and will add an additional load to our already overloaded supply system. This conflict in supply and demand will have a significant impact on U.S. Armed Forces.

The greatest user of helicopters in the U.S. Armed Forces is the Army. The rapid tactical movement of men and supplies by helicopters has become the norm. Helicopters have a significant influence on the maneuver doctrine of the U.S. Army, and this support is an integral part in the planning and execution of all tactical operations.

Black Hawks meet the need for increased performance and battlefield survivability. The aircraft is capable

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1. The importance of sophisticated high technology helicopters in detecting, tracking and destroying submarines is discussed in *The Air and Sea Lanes of the North Atlantic: Their Security in the 1980s* by Sherwood Cordier (Lanham, MD: University Press of America, 1981).

2. "Exclusive AFJ Interview with Admiral William S. Crowe Jr., Commander in Chief, U.S. Pacific Command," Deborah G. Meyer, senior editor, *Armed Forces Journal International*, May 1985, p. 106.

3. Since 1960, the United States has had mutual cooperation and security treaties with Japan.

4. *A Report to the Committee of Appropriations, U.S. House of Representatives, on Readiness of the U.S. Military—U.S. Army, Volume 1, March 1983.*

5. *"Military Balance," Defense Helicopter World*, Volume 4, No. 1, March-May 1985, p. 131.

of performing its mission anywhere in the world, even in the previously prohibited mountainous areas of hot Southwestern Asia. Essentially a utility helicopter—a performer of tactical troop lift and frontline logistical missions—the Black Hawk also has been purchased by the U.S. Army for special electronic warfare missions. The Army is planning to phase out about 1,300 vintage 1960 UH-1 Hueys, and replace them with UH-60As.

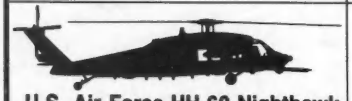
A number of special-mission Black Hawk derivatives also are being produced. Production of the Black Hawk is expected to extend into the 1990s.

Needing a complementary LAMPS helicopter to extend the range of antisubmarine operations, the Navy selected Sikorsky Aircraft as airframe contractor for its LAMPS III helicopter. In the 1960s, the developing technology in submarine detection allowed the Navy to think of extending antisubmarine warfare (ASW) beyond the immediate vicinity of a destroyer. Projecting defenses 100 miles forward of the fleet has greatly increased the effectiveness of detecting and identifying enemy submarines. Working as a team with a destroyer, the Seahawk greatly enhances the fleet's ASW effort. Controlled by the destoyer's combat information center, the Seahawk is a highly responsive total weapon system that detects enemy submarines at distances that exceed the enemy's ability to effectively engage U.S. forces.[6]

The need to replace the aging Sikorsky SH-3 antisubmarine helicopter has generated additional demand for SH-60B Seahawks. The new aircraft (the SH-60F) would be used for close-in fleet protection by equipping this version with a dipping sonar. The integration of surface and airborne ASW operations has produced one of the world's most effective countersubmarine weapons.

Also creating a demand for essentially the same airframe as the Army's Black Hawk is the combat search and rescue (SAR) mission of the U.S. Air Force. With specially designed equipment, the Air Force's HH-60D Nighthawk will be fully capable for low-altitude, adverse weather operations. A navigation system, plus terrain-following avoidance radar and additional fuel capacity, will increase the performance of this special derivative of the Black Hawk.[7]

**FIGURE 1: Service allocation of H-60 helicopter assets.**

| | COMBAT UNITS | OTHER UNITS | TOTALS |
|---|---|---|---|
| U.S. Army UH-60 Black Hawk | 1,491 | 284 | 1,775 |
| U.S. Navy SH-60B Seahawk | 150 | 54 | 204 |
|  U.S. Air Force HH-60 Nighthawk | 202 | 41 | 243 |
| Total | 1,843 | 379 | 2,222 |

Source: "The Military Balance, 1982-1983," *Air Force*, December 1983.

Numbers are estimates of helicopters that will be committed to combat or be available for replacement for combat losses because they are supporting critical missions, such as training.

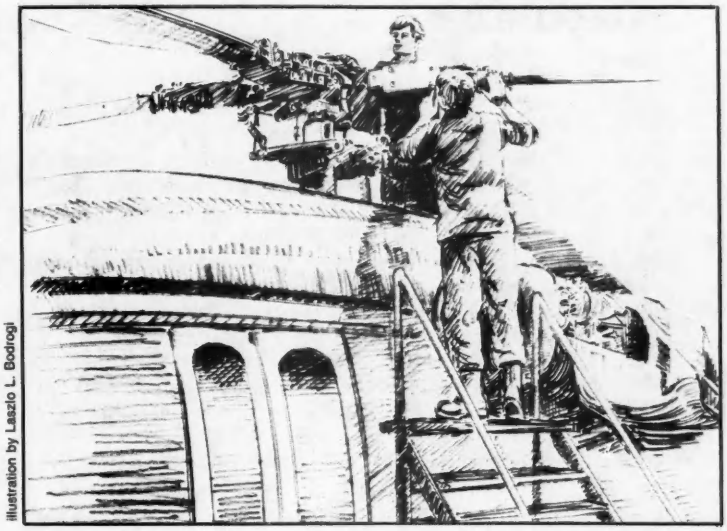


Illustration by Laszlo L. Bodrogi

The SAR mission is critical to air combat operations, as requirements for sustained tactical fighter support operations demand a rapid recovery of downed aircrews. The Nighthawk will replace the Air Force's aging combat SAR helicopter fleet with unique capabilities that make possible rescue missions into the most hostile weather and enemy antiaircraft environments—missions that previously could not be flown without unacceptable losses.

The U.S. Armed Forces established a 1985 demand for 1,775 UH-60A Black Hawk, 204 SH-60B Seahawk and 243 HH-60D Nighthawk helicopters. These numbers represent only budget constrained requirements to outfit the currently planned force, the force that is the nation's commitment to initial combat. Not all these aircraft would be committed to combat, but they would be needed to accomplish the overall mission. (The general breakdown is shown in figure 1.) Force requirements include aircraft designated to meet operational, training, replacement and maintenance needs.[8]

While allocating resources to supply U.S. forces with H-60 helicopters, the United States is ill-prepared to help its Allies in a global mobilization. In fact, this aid was not considered. The concern a nation has for its defense and its perception of the level of threat to its freedom and security are reflected in the amount of that nation's resources allocated to defense. The United States has established its concern at a spending level of about 6 percent of its gross national product (GNP). Other NATO countries spend less, about 4 percent; Australia and New Zealand spend about 3 percent; and Japan trails all industrialized nations with 1.6 percent of its GNP allocated for defense.[9]

Countries more directly threatened by the Soviet Union spend more for defense. For example, the People's Republic of China spends 9 percent and the Republic of Korea (ROK) spends 9 percent. As the threat of war increases, nations tend to greatly increase their defense expenditures, historically to levels exceeding 30 percent of GNP. Shortly before World War II (1934 to 1938), for example, expenditures for armaments doubled, tripled and, in the cases of Germany and Japan, even quadrupled.[10] Before 1934, the average levels of spending of these nations were less than 5 percent of GNP.

As the threat becomes more real, demand for armaments grows stronger, as reflected in percentage of GNP spent for defense by countries that are, in fact, prepared for war. The countries of Southwestern Asia are just one example: They are spending nearly 17 percent of their GNP for defense. Israel and Syria are spending more than 20 percent of their GNP for defense, while Egypt and Saudi Arabia are spending in excess of 10 percent. Using a level of defense spending equal to 6 percent of GNP as a prudent level of concern for security, in response to a Soviet annual expenditure exceeding 12 percent, relative levels of potential demand for defense equipment of cer-

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6. "Navy Stressing Survival of Fleet in Nuclear War," *Aviation Week and Space Technology*, 8 March 1982, p. 51.

7. " '83 Flight Test Set for Rescue Chopper," *Army Times*, 1 November 1982, p. 27.

8. Requirements for operational units, training base and maintenance differ in each Service, but are specified in requirements documents.

9. Since 1976, Japan has limited its defense expenditures to under 1 percent; the figure of 1.6 percent is derived by using the same general accounting criteria for Japan that are used for NATO countries. NATO includes such items as military pensions as part of the defense budget.

10. Alan S. Milward, *War, Economy, and Society 1939-1945* (Berkeley: University of California Press, 1977), p. 47.

tain countries are shown in figure 2.

Shortfalls in yearly spending by these major countries represent a significant deficiency in levels of armed forces and equipment. Countries depicted have one thing in common: They are all tied to the United States through defense treaties. These treaties bind the United States to some level of support in case of attack. To what extent the United States is obligated to support these nations with military equipment is not defined. But during World War II and the Korean War, and after the Mideast War of 1973, the United States responded to requests from Allied Nations for equipment. The same strategic assumption must be made today as was made in the World War II Victory Plan: American materiel must be deployed to U.S. Allies.[11]

The United States has the free world's largest armament industry and greatest industrial potential, which were displayed as the "Arsenal of Democracy" during World War II. Demands for equipment will come at the point when the free world perceives the threat to be sufficient to reevaluate national priorities and spend more for defense. Mobilization of U.S. forces, in all likelihood, will generate a global mobilization of the free world that, in turn, will cause a huge initial demand for U.S. defense products.

The combat effectiveness of any armed force may be heightened by increasing its responsiveness and mobility. Countries on the Pacific Rim, including those in North America, are absolutely dependent on sea lanes of communication for their existence. The Soviet Navy has the capability of interdicting these sea lanes.[12]

Japan, in particular, sees the need for ASW helicopters.[13] Prime Minister Yasuhiro Nakasone, in fact, has announced the following objectives:

- To have complete control of the four straits near the Japanese Islands.
- To limit the Soviet Navy's surface and subsurface activities.
- To secure and maintain the ocean lanes of communication between Guam and Tokyo and between the Strait of Taiwan and Osaka.[14]

To help attain these objectives, Japan has ordered two SH-60B Seahawks for evaluation as its ASW helicopter.[15]

Like Japan, Australia and New Zealand are dependent on the sea for their economic well-being. Australia sees its commitment to the Australia, New Zealand and the United States Pact as imposing the obligation to provide for its own defense. In addition to the practical peacetime benefits of the alliance to both countries, Australia recognizes that the defense relationship with the United States gives substantial grounds for confidence that, in the event of a fundamental threat to Australia's security, U.S. military support would be forthcoming.[16]

The number of H-60s needed by these Pacific nations is difficult to determine, but a definite shortage of these weapon systems exists. At the escalation of world hostilities, the demand will be immediate. Vital to our own security is the support of equipment needs of countries that will, in turn, support our objective of defeating Soviet aggression. Because our high technology weapon systems are the best in the world, our Allies will want and expect nothing less. Given the capabilities of the SH-60B Seahawk, it will be on the top of the want list of these nations threatened from the sea.

Following the provisioning of U.S. Allies, H-60s will be in great demand for replacing combat losses. Many scenarios and simulations indicate the likelihood of high combat losses. Loss

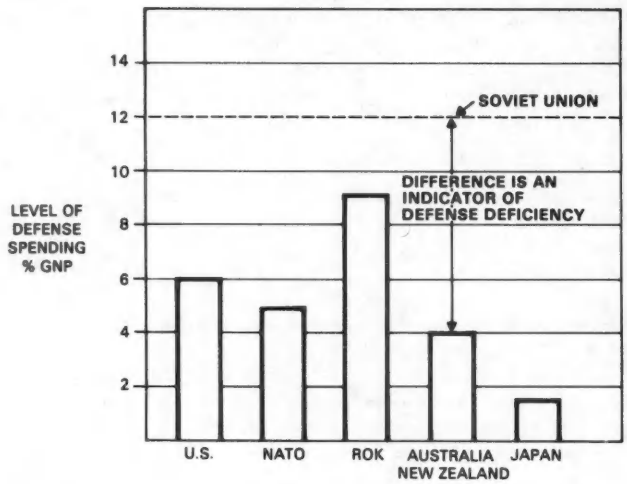


**FIGURE 2: Response to Soviet forces buildup during the early 1980s.**

photograph by SFC Jon E. Long

**Operations such as in Grenada in 1983 (above) and exercises such as Bright Star in 1982 (right) have shown that helicopter losses during ground operations will be high.**

rates for helicopters during the Yom Kippur War, the Falklands conflict and Grenada, for example, and Soviet losses in Afghanistan, indicate that attrition in ground combat will be high. The Royal Navy lost more than 20 helicopters during flight operations in the short war in the Falkland Islands.[17]

Attrition rates for UH-60s engaged in ground combat operations in a conventional war in Central Europe probably will be in excess of 60 per month. Projecting from the Falklands battles, operational losses for extended ASW operations in the North Atlantic and Indian Oceans and the Mediterranean Sea will exceed 10 per month. The U.S. Air Force will have significant losses of HH-60D helicopters, because the SAR mission is particularly dangerous; HH-60D losses also will exceed 10 per month. These attrition figures represent about 7 percent of the initial aircraft engaged in combat operations, plus noncombat losses for the total fleet. This attrition rate is very conservative, but it serves to illustrate the problem.

Combat losses are not the only cause of aircraft nonavailability.

Normal maintenance and repair of these high technology machines add significantly to their nonavailability. Peacetime flying rates drive the need for repair parts; the Army will purchase enough parts to keep 75 percent of the fleet in the air if each aircraft flies about 14 to 20 hours per month. Wartime flying hours are considered to be a minimum of 76 hours a month.[18]

At Ft. Lewis, WA, testing of the Army's first divisional aviation brigade was at a rate of 180 hours per aircraft a month. It represents a major increase in peacetime flying rates and significantly will increase the flying hour-based demand for repair parts. Demand for H-60 helicopters will start as the level of hostilities reaches the point where all nations become alarmed. U.S. Allies, many without a defense industrial base, will need to upgrade their military forces. They logically will turn to the most powerful free world force with requests to buy high technology weapon systems. Increased operations and combat losses will result in high demands for spare parts and additional H-60s.

### Initial Wartime Supply

In a central European conflict, the helicopter shortage resulting from the diversion of Black Hawks to U.S. Allies would be only one example of equipment deficiencies that will reduce conventional combat capabilities of the U.S. Army. Undoubtedly, other key items of equipment would be diverted. Decisions to deny the Army some of its primary weapons would be necessary and correct for the overall war effort. Shortages, and the fact that demands could not be filled quickly, would be caused by decisions made in

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11. Ibid., pp. 51-52.

12. Japan Defense Agency, *Defense of Japan 1981*, p. 93.

13. Ibid., p. 135.

14. *The Washington Post*, 19 January 1983, pp. A1, A13.

15. *Defense Helicopter World*, March-May 1985, p. 132.

16. *Pacific Defense*, February 1981, p. 39.

17. Derek Wood and Mark Hewish, "The Falklands Conflict, Part 1: The Air War," *International Defense Review*, Volume 15, No. 8/1982, pp. 977-1980.

18. See *U.S. Army Aviation Digest*, January 1985, pp. 38-39 for a general discussion of conclusions of the "AVLOG 84" analysis.

response to other national priorities during the preceding 30 years—decisions that were neither necessary nor correct.[19]

Shortfalls in equipment needed to sustain combat operations would be predictable, for the United States had deliberately allowed its industrial base to decline. A weak defense industrial base ensured that U.S. Armed Forces would not be able to contain a major thrust by Warsaw Pact countries.

On 29 December 1980, the U.S. Congress recognized the seriousness of problems with the defense industry base. That was the day when Rep. Richard H. Ichord (D-MO) presented the report of the Defense Industrial Base Panel of the House Committee on Armed Services for the 96th Congress. In his letter of transmittal, Ichord wrote:

> The panel finds that there has been a serious decline in the nation's defense industrial capability that places our national security in jeopardy. An alarming erosion of critical industrial elements, coupled with a mushrooming dependence on foreign sources for critical materials, is endangering our defense posture at its very foundation.[20]

How far has the industrial base declined? It has declined to the point where recovery is going to be expensive, and long in coming. Loren Thompson, a consultant to Congress on national security affairs, adds the following emphasis to the long-term nature of the problem of the declining U.S. industrial base:

> The inauguration of President Ronald Reagan presages a period of substantially increased defense spending. Within both the new administration and the new Congress there is widespread agreement that the erosion of American military strength must be halted, and that means much larger defense budgets. However, many proponents of increased defense spending *erroneously assume that the American economy is able to convert substantially more defense dollars into substantially more defense with little difficulty.* In fact, the ability of U.S. industry to expand defense production significantly any time soon is very much in doubt, and the reasons why are not hard to identify.[21]

These defense industrial base problems are directly attacking the primary source of U.S. military strength, according to United *States Military Posture for Fiscal Year 1983*. Any major confrontation with the Soviet Union, the report states:

> ...would place extraordinary demands on war materiel critical to sustaining U.S. force. A strong industrial base, capable of rapid expansion, is therefore critical to both deterrence and defense....
> Over the years, there has been little improvement in the capability of the defense industrial base to respond to potential wartime requirements...new directions proposed by DOD will take several years to implement, but if vigorously pursued should result in a surge capability for related combat essential materiel and an enhanced U.S. sustaining capability.[22]

The United States is not prepared for conventional war simply because it cannot sustain its forces nor replace equipment within any prudent timeframe—equipment that predictably will be lost on the battlefield, along with the operational capability it affords.[23]

Specifically, Black Hawk helicopters will not be available in Europe to replace losses; industry cannot produce additional airframes fast enough to cover those losses. This lack of production capability will be an additional difficulty for the commander already burdened by a shortage of other critical items.[24]

Most equipment used in training for combat will be in short supply after the first weeks of combat. The central issue here is whether the rate of production meets the need to sustain combat operations.[25]

Without a doubt, the United States eventually can outproduce any potential adversary. Time becomes the primary factor—time to recognize the threat; time for the Government to contract for more defense items; time for contractors to let contracts; time for subcontractors to set up and manufacture components for the prime contractor; and time to produce the weapon systems. Given ample time for all these process delays before the first day of hostilities, the U.S. economy would be able to supply U.S. needs, as well as the needs of U.S. Allies.

The shortfall in H-60s is shown in figure 3. By starting combat operations with only sufficient helicopters to equip the forces in being at that time, attrition guarantees shortfalls until years later, when U.S. industry can overcome the losses due to combat. The graphics demonstrate both the immediate problem and the eventual solution. The shortfall for the commander in Europe will exist if inventories on hand at the beginning of the war are not sufficient; and insufficient inventories will exist when peacetime requirements are less than wartime needs. The DOD procurement plans that should include realistic approximations of the total needs of combat (to include the requirements of Allies), but in fact provide only what is needed to fill peacetime force level needs of the U.S. Armed Forces, guarantee that the commander will fight without sufficient aircraft, once

attrition begins. Combat consumables, such as ammunition, have long been planned for, using a method that calculates inventories needed to cover the demand required from the onset of hostilities (D-day) to the time that production can meet combat expenditures (P-day).

Although not directly applicable to complete helicopter inventories, this D-day to P-day planning concept (figure 4, page 12) does emphasize front-end requirements for sufficient inventories to cover initial losses. As published in the May 1981 *Comptroller General Report to the Congress*, the D-day to P-day concept shows the difference in peacetime and wartime requirements. To sustain any force in war, all classes of supplies must be available to replace losses.[26]

Unlike the D-day to P-day view, H-60 helicopter production is geared to produce quantities to fill the needs of *current* force levels.

The H-60 totals are based on needs of U.S. forces to meet current force requirements. Production rates vary from 4 to 15 per month, and production will end in the early 1990s.

Programed production of H-60 helicopters for the 1980s and into the 1990s is designed to fill anticipated requirements. If war breaks out before the end of production, production rates may have to be increased to accelerate the initial force-fill and to replace combat losses. If war breaks out after the initial contracted buy, production must be restarted to cover combat losses. Any additional helicopters required to fill the needs of other than the current U.S. force structure will require even greater production rates.

How responsive the manufacturing system is to the needs of the nation's defense is the central issue of conventional warfare sustainability. Considerable evidence exists that industry will not be responsive. Manufacturing weapon systems is a lengthy process. The speed at which the prime contractor and his suppliers can increase the rate of production is limited by the complexity of the systems, materials

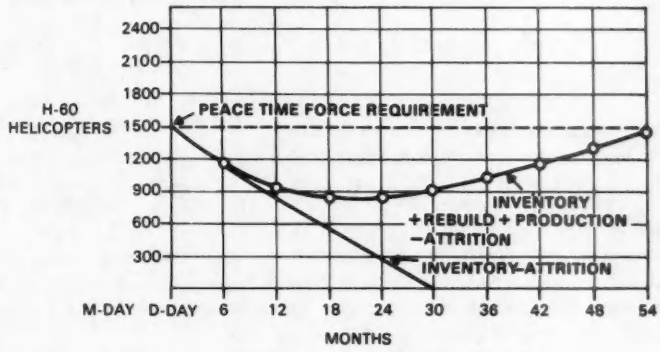


**FIGURE 3: UH-60 inventory production and attrition.**

Adapted for UH-60s from a Joint Department of Defense Office of Management and Budget Aircraft Industry Capacity Study of January 1977.
Level at peacetime assumes planned procurement is complete.
M-day is the day of mobilization and the day the President authorizes additional production, and was assumed to have been declared 6 months prior to start of hostilities.
Rebuilding of damaged aircraft will be critically important to the sustainment effort.

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19. *The Ailing Defense Industrial Base: Unready for Crisis*, report of the Defense Industrial Base Panel of the Committee on Armed Services, U.S. Congress, House, 96th Congress, 2d session, 31 December 1980 (Washington, DC: U.S. Government Printing Office).

20. Ibid., p. 1.

21. Loren Thompson, "The Defense Industrial Base: Going, Going...," *International Security Review*, Vol VI, No. II, Summer 1981, pp. 237-272.

22. *United States Military Posture for FY 1983*, prepared by the Organization of the Joint Chiefs of Staff (Washington, DC; U.S. Government Printing Office, 1982/83), p. 53.

23. A definitive and comprehensive history of U.S. policies and decisions concerning industrial base preparedness for mobilization is contained in *Industrial Mobilization: The Relevant History* by Roderick L. Vawter (Washington, DC: NDU Press, 1983).

24. General Alton D. Slay, USAF, in testimony before the Defense Industrial Base Panel, underscored the inability of U.S. industry to surge to meet needs generated by a conventional war.

25 *The Ailing Defense Industrial Base*, p. 1.

26. U.S. Comptroller General Report to the Congress, *DOD's Industrial Preparedness Program Needs National Policy to Effectively Meet Emergency Needs*, 27 May 1981, p. 15.

used, special tooling required to work the material, and the high level of skills demanded of the work force.

Dr. Jacques S. Gansler, vice president of The Analytic Sciences Corporation in Washington, DC, notes in his comprehensive study, *The Defense Industry*, that American industry simply cannot quickly meet the materiel needs of combat. Dr. Gansler, a former Deputy Assistant Secretary of Defense for Materiel Acquisition, writes:

> The industrial base of U.S. defense is becoming both economically inefficient in the production of defense materiel and strategically unresponsive in terms of the production speedup required to meet an emergency.[27]

Problems of the industrial base are many and have become apparent in both the public and private sectors.

Responsibility for maintaining a ready and responsive defense industry clearly rests with the DOD.[28]

Unfortunately, the Defense Department has failed to ensure industrial preparedness. The free enterprise system does not deliberately produce products it cannot sell, nor does it maintain in reserve a nonproductive expansion capability in case the National Government decides to accelerate production. Industrial responsiveness must be paid for; the United States failed to buy responsiveness and bought, instead, the "short-war" assumption that emphasized forces in being and reflected little concern for the industrial base.[29] The decline from a fully mobilized nation to one with extremely limited mobilization potential occurred over a 30-year period.

As the overwhelmingly major holder of nuclear weapons in the 1950s, the United States knew that it had to have an alternative to the singular nuclear response to aggression. It therefore maintained relatively large standing conventional forces and funded industrial facilities to support any war effort. During the Korean War, the U.S. Armed Forces were served by remaining World War II facilities; with the exception of certain types of ammunition, the industrial base was sufficient.

In the 1960s, the intensity of the Vietnam War increased, materiel was supplied essentially on a business-as-usual, lowest cost basis. The slow buildup in Southeast Asia did not require a surge to meet needs. As the war progressed, without a declared emergency, contracts were let with regard only to price, often to unqualified bidders. Many qualified and designated "planned mobilization producers," who had made previous agreements with the Government for war production, were ignored.[30]

The planning effort that the defense industry had expended under existing mobilization regulations did not count in the competition for contracts during the Vietnam War. The lack of a connection between predesignated mobilization suppliers and companies that obtained contracts ensured an industry-wide avoidance of that program. After the Vietnam War, conflicting national priorities led to a further reduction in concern for the industrial base. Decisions made on price, while often economically sound, were the cause, in part, of the final demise of the defense industrial base. Some industries went to where the money is—the commercial market. The decline of American industry continued through the 1970s largely because of the DOD's lack of financing of industrial preparedness, and reliance on the assumption that any war to be fought would be short and industrial mobilization would not be needed.[31]

The short-war concept assumes away any problem with industrial preparedness. Funds need not be spent on preparedness for a war that is so violent, and with attrition rates so

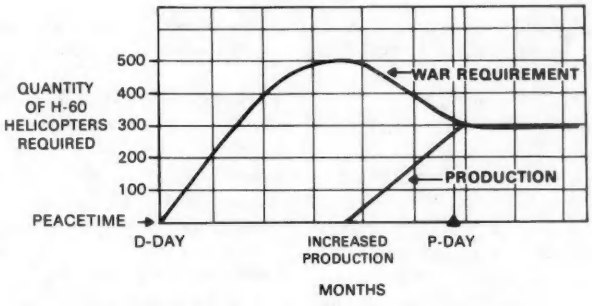


**FIGURE 4: D-day to P-day concept.**

P-day is the day production meets the needs of sustained combat. The curve of the wartime requirements line is historically derived and shows the initial buildup of intense combat followed by some dropoff in attrition to a steady state level.

high, that battles last only a few weeks. Such a war is far too short to require a national mobilization. To further ensure that funds are not allocated for the industrial base, the short war is assumed to start without sufficient warning to allow any production increase. The short war will be fought with the "force in being" and with whatever stockpiles of materiels are available.

This short war assumption in planning has had a significant impact on funding the defense industrial base. Most directly affected by this scenario are criteria for estimating the size of the country's industrial base.

Industrial base-sizing is the single most important factor in determining the size of production facilities for new weapon systems being acquired, as well as funding maintenance and modernization of facilities producing equipment under existing programs. Defense guidance steadily eroded the industrial base size from that required for total mobilization in 1977, to that required to support wartime requirements by 1979. This aspect of defense guidance finally reduced base-sizing criteria in 1980 to a level required to support *peacetime* requirements, with the added emphasis that this peacetime production would be at the most economic production rate.

The steady reduction in the size of the industrial base ensures little or no industrial surge or quick start-up to meet the demands of war; it plans for production that is going double shift simply to fulfill peacetime contracts. Problems associated with an undersized industrial base have been recognized and addressed in recent defense guidance.[32]

As conceived, this DOD policy of funding only the most cost-effective production lines does save money in the short run, but it also is very shortsighted. One of the easiest methods of ensuring some sort of measurable surge capability for any active production line, and a method used for years in Government contracts, is to plan on the addition of second and third work shifts as part of that surge capability. Simply hiring more people to work in a factory, however, is not necessarily the complete solution to increasing production; the largest problem lies with the ability of subcontractors to provide components and materials.

Without committed and planned subcontractor effort, surge capability is not possible. Many governmental agencies concerned with a responsive defense industrial base have identified other major problems with that base. These problems stem primarily from faulty planning under the DOD Industrial Planning Program. These faults include the following:[33]

- Unrealistic assumptions about availability of materials, facilities and equipment.
- Little or no information on second- or third-tier subcontractor capabilities.
- No identification of funding for industrial preparedness measures.
- Problems associated with mobilization being assumed away.

Supporting any major defense contractor are hundreds of individual companies under subcontracts to manufacture parts and components or supply materiel to the prime contractor. The sophisticated H-60 helicopter series is made up of hundreds of thousands of component parts; these parts are manufactured in production facilities that respond to real-world problems of manufacturing, as does the prime contractor.

Problems with manpower, materials, facilities, tools and other supplies are magnified throughout the industry. The overall effect is a large delay in response time. However, production delays due to subcontractor shortcomings generally are not the most serious problem.

Very few delays in the industry can exceed the delay of metal fabrication. Even if Sikorsky Aircraft has the necessary people, facilities and tooling in place, it must wait up to 46 weeks for aluminum extrusions, 115

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27. Jacques S. Gansler, *The Defense Industry* (Cambridge, MA: The MIT Press, 1980), p. 4.

28. Comptroller General's report to the Congress on Industrial Preparedness (see note 26), p. 1.

29. *Report of the Defense Science Board 1980 Summer Study Panel on Industrial Responsiveness*, January 1981, p. 21.

30. Association of the United States Army, *Army Industrial Preparedness: A Primer on What It Takes to Stay Until the War is Over*, 1979, p. 4.

31. Industrial preparedness measure is a procedure designed to shorten post mobilization day lead times or increase production. A part of the industrial preparedness program is the recognized efficiencies that contractors present to the DOD for consideration for implementational funding.

32. The Secretary of Defense reported to the Congress in February 1984 on current DOD industrial base guidance. Secretary Caspar Weinberger recognized the need to "reverse the alarming decline of U.S. industry."

33. Discussed in Dr. Norman Friedman's paper, *Surge Mobilization: The United States Versus the Soviet Union*, presented to the Sixth National Security Affairs Conference in 1979, is the "manpower" mobilization concept of the Soviet Union, characterized by high peacetime rates of production and stockpiled equipment to be manned by pretrained troops in a quick mobilization and almost instantaneous surge. The United States, on the other hand, does not maintain large stockpiles nor high current production rates, but relies instead on a superior industrial potential.

weeks for large titanium forgings and 36 weeks for titanium sheet and plate.[34]

These lead times have increased considerably for many reasons. The Federal Government's uncoordinated efforts at times create greater problems.

For example, Federal pollution standards and certain wilderness preservation programs have devastated the metal industry. The fact that forging manufacturers use large hammers, causing noise and vibration levels exceeding standards of the Occupational Safety and Health Agency, has caused a portion of the forging industry to leave the business or move out of the country to be competitive in price.[35]

Acquiring forgings necessary for production has become increasingly more difficult for prime defense contractors. Solicitations for forgings often are for small quantities of special items. As many as 40 percent of forgings suppliers do not bother to respond to Government-related requests.[36]

The result is significantly increased lead times, often from foreign sources, that almost doubled during 1976 to 1980. An example is a titanium bolt: In 1976, 32 weeks were required for delivery; in 1980, delivery took 62 weeks. In 1985, 26 weeks delivery time was required even in a period of limited demand. The lead time required for basic components and parts has become the most significant factor in the decrease in responsiveness of U.S. industry.

As an additional note, despite recent corrective legislation, the U.S. Government often does not pay its bills on time, which can mean the difference between life and death for small contractors who supply vital materials. The interest on money borrowed by the small contractors to cover the 1½-month delay in payments often means that they do not survive or, at least, are not interested in future Government business.

American industry responds to profit and loss as the economic system dictates. To be successful in the defense industry, a company must produce efficiently those items specified in a contract. The ability to rapidly surge production is based on having materials, facilities and manpower readily accessible. Prestockage of items necessary for production is costly but necessary for surge. In this case, cost savings also directly limit surge capabilities. Because long lead times are required for critical H-60 helicopter components, any increase in production must be delayed by these lead times. Limits exist to what a contractor can do, even if lead times for necessary supplies were reduced; these limits include the availability of facilities, special tooling and skilled manpower.

**ABOUT THE AUTHOR**

**Colonel George Michael Mullen, U.S. Army, recently relinquished command of the Aviation Brigade, 1st Infantry Division (Mechanized), Ft. Riley, KS, and is currently assigned to the U.S Army Research and Development Standardization Group, Ottowa, Canada, National Defense Headquarters. He is a graduate of the United States Naval Academy and earned a master of science degree in aerospace engineering from the University of Alabama.**

**Key assignments for Colonel Mullen include director, Space and Technology Directorate, Headquarters, U.S. Army Training and Doctrine Command; deputy director, Army Space Initiative Study; and deputy director, AirLand Forces Application Agency. He also has served as commander, 3d Squadron, 5th Cavalry, at Ft. Lewis, WA; and as an experimental test pilot and director, Plans and Programs, Army Engineering Flight Test Activity, Edwards Air Force Base, CA.**

**Colonel Mullen is a graduate of the Armed Forces Staff College, Naval Test Pilot School, Defense System Management College and the Industrial College of the Armed Forces. He researched and wrote this essay while a Senior Fellow at the National Defense University.**

34. From the Joint Logistical Commander Conference 1979.

35. General Alton D. Slay, USAF, commander of the Air Force Systems Command, testified before the Congress that:

> there are currently 80 different laws administered by 20 different Federal agencies that directly or indirectly affect the domestic nonfuel industry. The complex regulatory processes; the government demand for data; and the environmental, safety and health requirements often prevent companies from starting new operations or expanding existing capacity.

36. *Defense Science Board Report on Industrial Responsiveness*, January 1981, p. 49.

ATC FOCUS
U.S. Army Air Traffic Control Activity

# ATC Standardization

**Master Sergeants Ralph B. Bischoff, Charles P. Kline and Jon T. Eubanks**
U.S. Army Air Traffic Control Activity
Fort Rucker, AL

THE UNITED STATES Army Air Traffic Control Activity (USAATCA), Systems Evaluation Division, Ft. Rucker, AL, is here to support you, the provider of air traffic services. The ATC chiefs, facility chiefs and managers who may think otherwise have not been visited recently by the systems evaluation team. We do not wear a black hat during our evaluations; we are here to help you improve your facility operations. This article clarifies some of the misconceptions that may be present for those of you due a visit in the near future.

The U.S. Army operates and maintains many ATC facilities throughout the world. The facilities are managed in accordance with (IAW) guidance given in regulations, technical manuals (TMs), field manuals and other policymaking directives. The problems usually arise when directives are interpreted and implemented. Unfortunately, some of the interpretations are incorrect and misapplied. Remember the game where several people sit in a circle and whisper a short story to the next person? That person passes it to the next, and so on until the circle is complete? If the last person repeats the story correctly, you have no problem. However, if the final story little resembles the original, there was an obvious breakdown in communications. When communications break down in the ATC community, we have a problem with standardization that could affect the worldwide mission of ATC.

Safety and standardization are our most important responsibilities. We carry out these responsibilities by ensuring user compliance with all applicable regulations, policies and procedures. It is not expected that all facilities be clones of each other, only that they are operated and managed using the same basic criteria and policies.

Your facility should be ready for an evaluation at all times. You should setup your own internal checklist for the operational requirements of your facility, be it daily, weekly, monthly, etc. The development of your checklist is the easy part. Ensuring that it is used, and used correctly, will require constant vigilance on your part. Once you have your system set up, your facility operations will be smoother.

Every rated controller should be trained in the operation of the facility. This develops the junior controllers and prepares them for when they have their own facility, and they eventually will. The leadership and guidance provided now will ensure continuity throughout the ATC community today and for years to come. Using sound judgment, correct procedures, and providing safe and reliable ATC services to the aviation community ensures that our junior controllers are prepared for the future.

Overall, standardization throughout the field is good but there are still a few undotted "i's" and uncrossed "t's" to be corrected. During the past 18 months the following problem areas have been found at many facilities:

- Trainee/controller evaluators need to call it like it is. If the individual is marginal or unsatisfactory, he or she should be evaluated as such. Safety and proficiency take precedence over personal feelings; to do less hurts the trainee and the system.
- Preventative maintenance checks and services (PMCSs) are not being performed by the operators, and it shows. All too many facility chiefs and controllers feel that PMCSs are a maintenance function; therefore, it is not being done. This is a mistake. Facility managers and controllers should constantly interrelate with maintenance personnel and make certain each responsibility is understood. Read, teach and use your operator TMs.
- Tape recorder checks are not being performed correctly. Periodic checks are not being made during shift or when a piece of equipment returns to service. Ensure the supervisor override position was operating and recording properly.
- Letters of agreement (LOAs), operations letters and waivers are not being reviewed and updated on an annual basis as needed. LOAs that involve the Federal Aviation Administration are not always being routed through the appropriate Department of the Army Regional Representative office.
- Minimum vectoring altitude charts are not being updated on an annual basis. This is a process that must be accomplished before expiration.

If you have a question on policy or procedures, please do not hesitate to contact the USAATCA ATC Management Office, Operations and Procedures Division, at AUTOVON 558-2025/4893. Also, if you feel you have a correction or a change that should be incorporated, submit a DA Form 2028 IAW FM 95-93, paragraph 122.1.

*Readers are encouraged to address matters concerning air traffic control to: Commander, USAAVNC, ATTN: ATZQ-ATC-MO, Fort Rucker, AL 36362-5265.*

# Spelling **SAFETY** a New Way

The following excerpts are from an address by COL(P) Marvin E. Mitchiner Jr., Director of Army Safety, to graduates of a recent Initial Entry Rotary Wing Course at Ft. Rucker, AL.

IN SUPPORT OF one of our recent media campaigns at the Safety Center, we were discussing what major ideas could be associated with each letter in the word *safety*. While we came up with a lot of topics representing each letter, a few of them are especially important, and I'd like to share with you our final selections.

We affixed **standards** to the letter **S**. Standards really are key to our safety program. In this year with the Army theme of "training," we have adopted training to standards as the cornerstone of our safety strategy. We use the premise that safe performance is a predictable result of performing to standard, and performing to standard is a result of training to standard. Training to standard leads directly to discipline and discipline leads directly to safety.

When we look at accidents in the Army, we find that people certainly don't cause them on purpose. But human error is still a definite cause in the majority of all Army accidents. Experience also shows us that the root cause of the problem is failure to train to standard or to the right standard.

When we investigate human-error accidents, we look at four areas in which failure to meet standards might have contributed to the accident. We have found that there can be a command failure when standards are not clear or practical or do not exist. We can have a training failure when standards exist but are not known or ways to achieve them are not known. We can have a leadership failure when standards are known but are not enforced. And, finally, we can have an individual failure where standards are known but are not followed.

Training to standard is a key ingredient in the integration of safety into the way we do business. But there is another area dealing with standards that should be mentioned. That's setting the standard. You are officers, and as such you are expected to meet the highest standards both on and off duty in order to set standards that others will try to reach.

Don't walk by mistakes. Don't accept less than the required standard. In enforcing standards, I have found two things to be true: An indiscipline left unchecked will stay with you; and, if you fail to enforce a standard, you have made that your new standard.

The bottom line is that training to standard, setting the standard, and enforcing the standard will lead to a sixth sense—the sense of safety awareness.

**Awareness**. That is what the **A** in *safety* stands for.

When we visit units with good safety records, we consistently find a keen sense of safety awareness, both in and out of the cockpit, on the part of all unit personnel. We find that the entire chain of command feels that they can influence safety, and they do. They are aware of their safety record and take pride in it. To them it is a key performance indicator that they are a good organization.

Another important thing is that they maintain that safety awareness. They don't let down. Too many times we've found, in reviewing accident reports, that the mishap occurred after the most demanding part of the mission was over: on a flight home after completing a demanding nap-of-the-earth route under night vision goggles; in a vehicle accident after performing flawlessly in a combined arms live-fire exercise. Safe units maintain a high level of safety awareness at all times.

An especially interesting thing we've found is that new aviators are true energizers in safety awareness. They bring with them the attention to detail and discipline they had to exhibit in flight school. Experience is showing that the new aviator follows the book.

**Following the book**, then, is the **F** in *safety*. It is here that you can have an immediate impact on unit safety and professionalism. Following the book is the foundation of

the entire aviation safety program. Procedures have been established for everything from preflight checklists to in-flight emergencies. Throughout flight school, the emphasis is on doing things as you are taught—to follow the book. It works. Don't leave it behind at flight school. Take it to your unit and use it. You'll find that following the book is contagious. When one does it, others will, too.

There isn't a book for every situation, however. That's where **employing risk management** comes in. That's our **E**. When you employ risk management techniques, you're putting a smart decision-making process to work. It's a process that identifies the areas that are the highest risk and diverts resources to those areas to reduce those risks.

The mission must be accomplished. Risk management is not a way of getting around that fact; it's a way to accomplish the mission with the least possible risk.

Field Manual 100-5 demands leaders who are bold risk takers and innovators in accomplishing the mission. But risk taking must be prudent risk taking that comes after an assessment of risk to determine which risks are acceptable and which are not. That is the distinction between a blind gamble and a prudent risk. Risk management won't always prevent accidents. What it will do is provide you a discriminator for the process of making tough decisions.

The ability to employ risk management will also increase **technical and tactical proficiency**. That's the **T** in *safety*.

Being tactically and technically competent is not an option; it's an obligation. It's the way you establish credibility with seniors, peers and subordinates. Competence is what gives you access to the capabilities and limitations of your people and equipment. Your competence and credibility allow you to confront the really tough safety issues.

Gone are the days when aviators simply followed the aircraft in front. Gone are the days when warrant officers were just great pilots, and commissioned officers made all the decisions. All aviators must be prepared tactically; our combat arms brothers expect it. And no longer can commissioned officers get by on tactical proficiency alone. They are expected to be instructor pilot certified soon. Battalion and brigade commanders and even company commanders are instructor pilots now. They must know how to conduct an air mission commander's brief for a tactical operation.

Your tactical and technical competence is the ingredient that allows you to be a soldier, a leader, an officer and an aviator—in that order. I say soldier first because you are in combat arms. And to lead soldiers and to lead them safely, you must first be one.

The final letter in the word *safety* is probably the most important. It is the **Y** that means **you**. That really sums it up. You are the "why" of safety. You are the ones who benefit most from it, and you are the ones who will make it work.

As leaders, you must exercise tough caring, and that isn't always easy. Too many times in reviewing accident data we find that somebody knew the individual was headed for trouble. Somebody close to the victim knew of a personality trait, a behavior or an attitude that signaled the potential for an accident. Yet nothing was done about it. Tough caring means tough decisions. I think we all want to give the benefit of the doubt to the individual, but when we know about an unsafe practice or attitude, we cannot just look the other way and hope things turn out right. The consequences are too high.

One final point on how you can really influence safety—and you can start in just a few minutes—and that's to buckle your seatbelt. Half the fatalities we suffer in the Army result from privately owned vehicle accidents; seatbelts could prevent two-thirds of those fatalities. So, if you take nothing else from my message today, please remember to buckle your seatbelt because you are the Army's most precious resource.

## U.S. Army Class A Aviation Flight Mishaps

| | Number | Flying Hours | Rate | Army Fatalities | Total Cost (in millions) |
|---|---|---|---|---|---|
| FY87 (through 15 August) | 33 | 1,463,912 | 2.25 | 41 | $76.8 |
| FY88 (through 15 August) | 28 | 1,497,093* | 1.87 | 38 | $61.0 |

*estimated

# PEARL'S

## Personal Equipment And Rescue/survival Lowdown

**NAVAIR 13-1-6.7 on Personnel Protective Equipment**

This manual is to be revised to extend 90-day inspections to a 180-day inspection cycle for the following ALSS:

| Nomenclature | P/N |
|---|---|
| CWU-27/P Summer Flyer's Coverall | MIL-C-83141 |
| CWU-36/P Summer Flyer's Jacket | MIL-J-83382 |
| CWU-45/P Cold Weather Flyer's Jacket | MIL-J-83588 |
| G-1 Intermediate Flyer's Jacket | MIL-J-7823 |
| CWU-18/P Extreme Cold Weather Trousers | MIL-T-83385 |
| Winter Flyer's Hood | MIL-H-85037 |
| GS/FRP-2 Fire Resistant Flyer's Gloves | MIL-G-81188 |

*Note:* Revision will be included in change 11 to the manual. We are giving you this information as we also use Navy personnel protective equipment when it is necessary for the mission of ALSE. The Naval Air Systems Command POC is Ms. L. Wormser, Code 602416, AUTOVON 441-7164.

**Let's Hear From You ALSE Users**

A word of support and encouragement would be sincerely appreciated. Or better yet, why not prepare some articles for PEARL'S. "She" would thank you from the bottom of "her" heart. I will be most happy to do the initial editing. Then the *Aviation Digest* staff will be happy to do the final editing so we will truly have administratively and technically correct articles for the benefit of all readers and users of PEARL'S.

**Summer Flyer's Coveralls—CWU-73/P and CWU-27/P**

The Naval Air Development Center is preparing an engineering change proposal to authorize the removal of lower leg pockets of subject coveralls at the discretion of aircrews. Such action will be staffed before the Army authorizes such action. (This notice is for information only at this time.) Ms. Sue Reeps, Code 602431, AUTOVON 441-1926, is the action officer.

**Army Aviation Systems Program 82 Update**

Personal equipment and rescue survival lowdown, more commonly referred to as PEARL'S, had "her" beginning in early 1967 and has been published monthly each and every month since in the *U.S. Army Aviation Digest*. Through mutual agreement between Major General James C. Smith, former commander of the U.S. Army Aviation School and Center, Ft. Rucker, AL, and the then U.S. Army Materiel Development and Readiness Command project officer for aviation life support equipment (ALSE), Mr. A.B.C. Davis, the permanent change of station of PEARL'S was effected. In 1979, PEARL'S was moved from the U.S. Army Safety Center, Ft. Rucker, AL, to the Aviation Systems Command, St. Louis, MO. PEARL'S has continued to live in the *Digest*, bringing you the latest information in this critical area.

A typical example of one of the first articles to appear was a letter to the editor (July 1967 issue) that read:
Editor-in-Chief, *U.S. Army Aviation Digest*

I call your attention to page 49 of the March 1967 issue of the *Aviation Digest*. You invited readers to see how many mistakes they could find. Upon turning to page 63 I was surprised to see that the second most important piece of equipment that an aviator should wear was not listed.

Why even PEARL on page 52 knows that the aviation flight suit should be worn at all times when flying because one of the most flammable objects that the pilot on page 49 is wearing is his nice fresh, STARCH IMPREGNATED uniform.

SP6 J.L. Bridgewater
Co D, 15th TC Battalion
1st Cavalry Division

Dear Specialist Bridgewater:

The most important thing about what aircrewmembers wear, whether flight suits or fatigues, is that the material be inherently fire retardant or treated to make it fire retardant. Despite his other mistakes, the pilot on page 49 of the March issue was wearing fatigues that had been treated by the fire retardant process shown on page 52 of the May issue of the *Aviation Digest*.

PEARL

The first of a series of five articles on the subject of Army Aviation Systems Program Review appeared in the June 1982 issue. The materiel panel identified ALSE as the second major issue. A great deal of our current ALSE is either not designed specifically for aircrew use or for use with our current aircraft and, thus, is not compatible with aircrew task performance. To effectively deal with these

shortcomings, the panel had to address these major subissues.

First, protection of the eyes from high-intensity light sources such as lasers and nuclear bursts, exists in industry and other services, but the challenge is to provide protection only when needed to Army aircrews. Solutions endorsed by the panel are incremental and progressive in the near-term. We must use those items currently available from industry and the Air Force despite the limitations involved. Mid-term efforts should be directed toward compatibility among the various devices, with far-term development of both laser and nuclear flashblindness protection into a single device worn by the aircrew. Ultimately, we should transition this protection into an integral part of the aircraft that protects the aircrew as well as sensors and optics worn by the aircrew.

The chemical protective is the second subissue. Overboots all but eliminate pedal feedback and become easily entangled on aircraft parts; gloves are bulky and reduce tactility; the overgarment contributes to heat stress, hamper's movement and is inflammable. The current protective mask, the M-24, has many deficiencies. We are currently working with the XM-43 that has recently been type classified and is currently being procured. A general shortcoming is even more dramatic when nuclear, biological and chemical (NBC) protective clothing is used and current equipment is incompatible with aircrew tasks among ALSE components.

The substance of the third subissue is the need for a task based, total system designed to interface with the aircraft, protect against the threat and environment and facilitate aircraft task performance. The vehicle for this is an aircrew life support system integrated battlefield. We now recognize the man and machine interface requirement. We must manage both product improvements and new development of ALSE as intensively as if they were part of the aircraft systems package. In the far-term, aircrew life support systems must be integral to the airframe and, to close the loop, we must take steps to centrally manage ALSE. We have taken steps to do just that through the project manager (PM)—ALSE and the PM for clothing and individual equipment. But we must elevate the PM to a Department of the Army chartered single focal point for the Army as an equal to the Department of Defense tri-Services for life cycle management of the aviation life support system program.

The fourth ALSE subissue is again NBC related. It is critical because Army aviators are particularly susceptible to incapacitating chemical agents.

The fifth subissue is that of avoiding contamination. Current systems do not allow our aircrews to look ahead and detect contamination before entering a given area. We also lack the means to protect our aircraft from contamination while on the ground. If fully funded in the near-term, aviation-specific solutions will begin to appear in the mid-term.

The sixth subissue pertains to decontamination. Present aircraft paints, canopies, gaskets, avionics and other components absorb agents, making them virtually impossible to decontaminate. We are working on this problem.

The seventh subissue is search and rescue. We do have the emergency locator transmitters for this purpose and the personal locator system is being worked on. We are well on our way in these two areas.

The eighth and final subissue is flight data recorders, perhaps better known as flight and maintenance information systems. The advantage to be gained is the prevention of aircraft and crew losses through improved aircraft accident investigation and maintenance techinques. The panel recommended that flight data recorders eventually be installed on all Army aircraft. However, priority for development should be given to advanced aircraft systems because current commercial transport flight data recorders do not meet the Army's criteria for small, lightweight units. The following are the panel's ALSE findings:

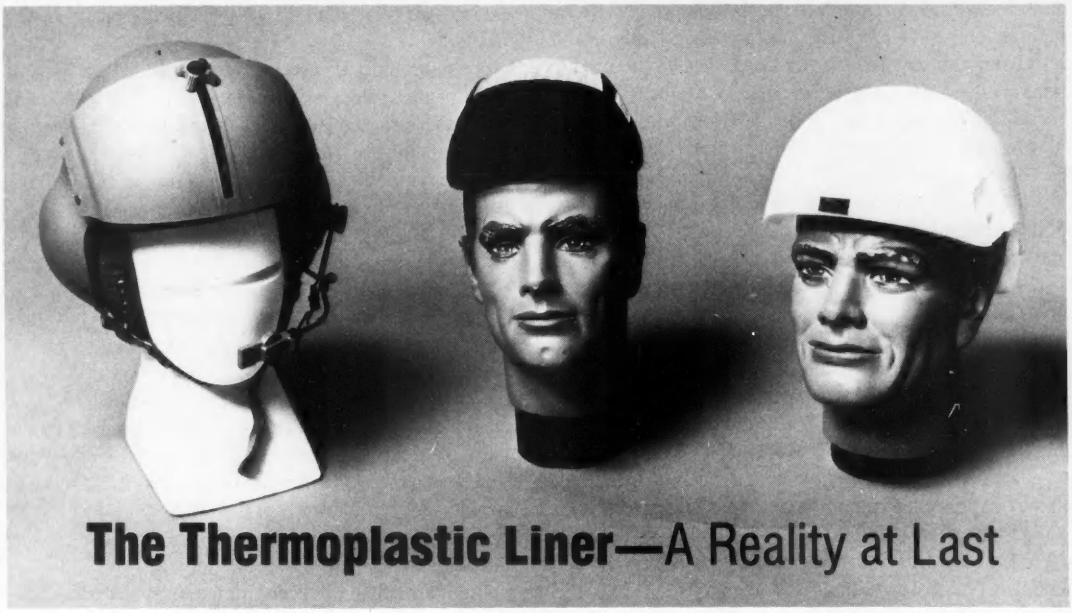
- Additional funding needed for the Army Materiel Command long-range research, development and acquisition program.
- Higher priority needed.
- Funding inadequate in near-term.
- Funding inadequate in mid-term.
- Laser protection programs for sensors and optics worn by aircrew not fully defined or funded.

ALSE is still working on solutions to the panel findings of 1982. Together, we can make these things happen.

**Key ALSE Personnel Losses**

We have had to take the bad with the good. Unfortunately within the past several months two important key players have retired—Mr. Al Cargen, formerly a key ALSE team member with the 5th U.S. Army and focal point for the Army National Guard; also, MSG "Jim" Snyder, 5th U.S. Army and Army Reserve ALSE "King Pin." Both of these gentlemen supported ALSE to the highest degree daily. We will take a long time to recover from these losses, and it will be up to you, the sustainers and new ALSE people, to carry the ball.

*If you have a question about personal equipment or rescue/survival gear, write PEARL'S, AMC Product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-3573 or Commercial 314-263-3573.*



# The Thermoplastic Liner—A Reality at Last

photographs by SPC Richard F. Small

**Major Daniel W. Gower Jr.**
Director, Biodynamics Research Division
U.S. Army Aeromedical Research Laboratory
Fort Rucker, AL

FOR THE LAST 4 years, the U.S. Army Aeromedical Research Laboratory (USAARL), Ft. Rucker, AL, has been conducting studies aimed at alleviating the age-old problem of helmet "hotspots." As the use of night vision goggles has increased, so has complaints of headaches, hotspots and helmet instability.

In 1984, the Gentex Corporation, Carbondale, PA, introduced a new product known as the thermoplastic liner (TPL), shown at figure 1. The TPL was tested and approved for its crashworthiness properties. It was later used by USAARL to alleviate medical problems caused by a poorly fitted helmet. Those of you who have hotspots or headaches caused by your SPH-4 helmet know too well these problems are annoying, to say the least, and border on safety-of-flight issues at the most. Our success with the "problem fit" program and the use of the TPL led us to push for acceptance of the TPL as an improvement to the existing SPH series of helmets. As in any item entering the Army system, the TPL must pass the standard battery of tests to ensure it is accepted under all of the conditions it would conceivably be used in.

On 1 June 1987, the U.S. Army Aviation Board, Ft. Rucker, completed its study on the TPL and forwarded the results to Natick Research and Development and Engineering Center, Natick, MA. In November 1987, the program manager for clothing and individual equipment (PM-CIE) held a type-classification review board, and the TPL was accepted as an approved item of aviation life support equipment (ALSE).

In July 1988, the Defense Personnel Support Center (DPSC), Philadelphia, PA, assigned three national stock numbers (NSNs) to the three sizes of the TPL. These three sizes are available to fit the full range of aviators currently wearing the SPH series of helmets. The three sizes are small-regular, regular and extra-large. Units may now order the TPL installation kits through the supply system

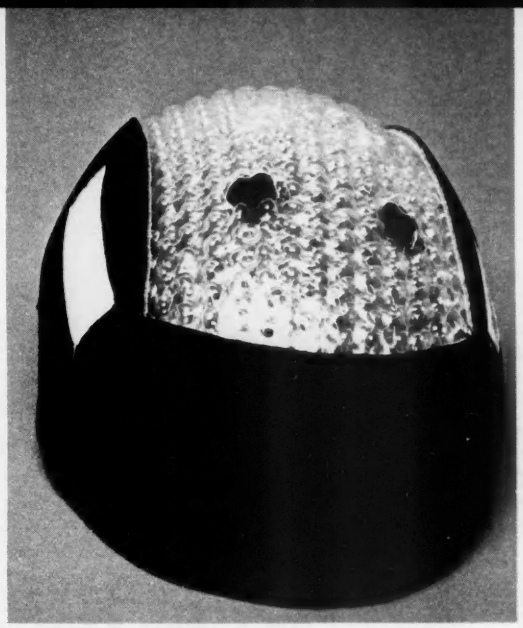


**FIGURE 1: The newly developed theromoplastic liner initially approved for its crashworthiness properties is also effective in alleviating medical problems caused by a poorly fitted helmet.**

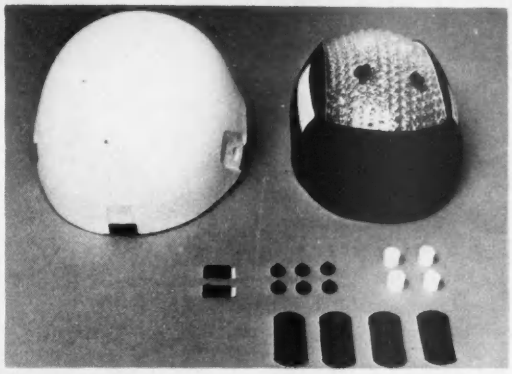


**FIGURE 2: The theromoplastic installation kit includes the theromoplastic liner, Velcro™ pads, strips of Velcro™, Styrofoam™ plugs and rubber plugs.**

(figure 2). Until the NSNs are placed in the Army Master Data File, the message from the commander, U.S. Army Support Activity, Philadelphia, PA 112219Z Jul 88, subject: Thermoplastic Liner Conversion Kit for SPH-4 Flyer's Helmet, should be cited as the authority for purchase. The TPLs can currently be bought through local purchase channels on a sole source basis from the Gentex Corporation, P.O. Box 315, Carbondale, PA 18407.

The NSNs for purchasing the TPL modification kits are as follows:

- Small-regular—NSN 8415-01-281-5497.
- Regular—NSN 8415-01-281-5498.
- Extra-large—NSN 8415-01-281-5499.

In addition, until this item is stocked at the DPSC level units should consider consolidating their orders with other units to take advantage of the "volume cost reductions" offered by the manufacturer. It is our understanding that if a unit orders two to nine kits the price is $65.00 each. If a unit orders 10 to 99 kits the price is $60.00 each. If more than 99 kits are ordered the price is $50.00 each. The above message states that the approximate cost of the item is $60.00. A call to Gentex at 717-282-3550 will confirm the price for your order.

Because the TPL is a newly recognized item of ALSE, there is not much in the field for the ALSE technician to learn about the care and installation of the TPL. The U.S. Army Aviation Systems Command, St. Louis, MO, is currently rewriting the SPH-4 helmet operator's manuals to include the installation, inspection and care criteria for the new TPL. USAARL Life Support Equipment Branch recently completed the TPL—(Installation Fittings and Maintenance for the SPH-4 Helmet), video tape number -2C/600-011-1392-B A0522-88-0033, running time 29 minutes, 53 seconds. To obtain a copy, send a blank 30-minute tape to: U.S. Army Aviation Center, Training Service Center, Building 9313, Ft. Rucker, AL 36362-5000.

On another good news note, testing is underway at Ft. Rucker on the improved SPH-4 helmet. This helmet includes a Kevlar™ shell, crushable earcups, adjustable retention assembly, dual visors, thicker energy absorbing liner and the TPL. After the customer test for form, fit and function, a type-classification review panel will be held in November 1988. If testing is successful, the Army will procure a retrofit kit to install all of the items noted above on the current SPH-4 helmets inventory, with the exception of the shell. When the present supply of SPH-4 helmets is depleted from the DPSC helmets stockage, the improved SPH-4 helmet will be purchased as a unit. This helmet exceeds the safety performance of the current SPH-4 helmet in all areas of technical testing; i.e., crash-force attenuation, helmet retention characteristics, overall weight, adaptability to dual visor laser protection and hearing attenuation. In short, we will have matured from 1960s technologies to 1980s technologies.

For additional information on this or other ALSE matters, call Major Dan Gower, AUTOVON 558-6943, Commercial 205-255-6943; Major John Barson or Staff Sergeant Doug Pritts at AUTOVON 558-6881, Commercial 205-255-6881—or write to these individuals at USAARL, P.O. Box 577, Ft. Rucker, AL 36362-5292.

*The Aviation Medicine Report is a monthly report from the Aviation Medicine Consultant of TSG. Please forward subject matter of current aeromedical importance for editorial consideration to U.S. Army Aeromedical Center, ATTN: HSXY-ADJ, Ft. Rucker, AL 36362-5333.*

A Boeing Helicopter CH-47D Chinook is guided into position behind an Air Force HC-130 tanker during qualification of the aircraft's aerial refueling capability. Qualification of the system marks the first time such aerial refueling capability has been demonstrated on a production tandem rotor helicopter. The Boeing CH-47D Chinook with in-flight refueling capability will greatly increase the U.S. Army's ability to conduct a variety of long-range missions such as self-deployment.

# CH-47D Chinook Qualified for In-Flight Refueling

BOEING HELICOPTERS has qualified the first CH-47D Chinook in-flight refueling system for the U.S. Army during ground and flight evaluations at the company's Greater Wilmington, DE, airport flight center.

The first production model CH-47D having in-flight refueling capability was delivered to the Army in early July 1988. The new refueling system will greatly increase the Army's ability to use the Chinook for a variety of long-range missions.

Boeing Helicopters' test pilot Mr. Bob Gradle tested the Army's CH-47D in a series of probe and drogue engagements with U.S. Air Force and Marine Corps/Lockheed HC-130 Hercules tanker aircraft.

Mr. Gradle described the operation as being as simple as routine formation flying. "We'd get into position behind the tanker, which was flying at about 110 knots, or around 20 knots above its stall speed," Mr. Gradle said. "We'd stay in that formation for whatever time was required to fill the tanks, which was about 6 minutes to take on 1,000 gallons of fuel."

Mr. Larry Hartman, Boeing Helicopters' flight test engineer, explained that, until now, the only production helicopters refueled in-flight have been single-rotor helicopters. "Previously," Mr. Hartman said, "Boeing had conducted two aerial refueling programs to prove the feasibility of refueling tandem-rotor helicopters in flight.

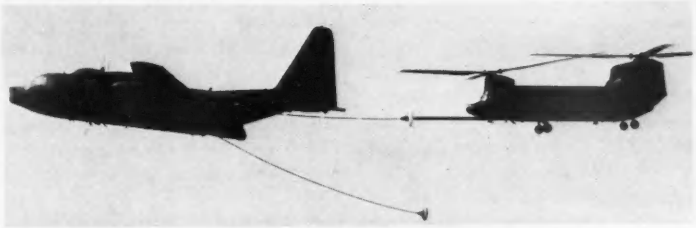
"We used a telescoping boom, which, when fully extended, put its tip roughly 3 feet out in front of the rotor disc where it could safely contact the tanker's drogue," Mr. Hartman commented.

The first tests, conducted in July 1985, consisted of nine sorties totaling 9.8 flight hours (see "First Chinook Aerial Refueling," *Aviation Digest*, December 1985). During these tests, Mr. Gradle discovered the Chinook's rotor downwash forced the drogue downward and kept it safely clear of the rotor disc. Based on that observation, a second program was introduced in December 1986, using a CH-47D equipped with a fixed composite-shell refueling probe that allowed drogue engagement while under the Chinook's forward rotor disc.

During the qualification program, Boeing and military pilots evaluated the shorter fixed probe, using both the HC-130s left and right refueling drogues. These flights included successful day and night engagements in a variety of smooth and turbulent air conditions. Night sorties were flown both with and without the pilots' use of night vision goggles.

The U.S. Army's CH-47D is a modernized version of the famed Boeing Chinook medium-lift helicopter. Boeing Helicopters is presently under contract to bring 328 CH-47s up to D-model standards, with 240 of these helicopters covered by a multiyear procurement contract.

photos courtesy of Boeing Helicopters



**Boeing Helicopters CH-47D Chinook demonstrated its aerial refueling capability during tests conducted at the company's Wilmington, DE, flight test facility. The successful ground and flight testing marks the first time a tandem rotor production helicopter has been qualified for in-flight fuel transfer. The first production model CH-47D with in-flight capability was delivered to the U.S. Army in July.**

# The Real Meaning Behind "OLR"

**Colonel Daniel J. Rubery**
Acting Logistical Director
U.S. Army Aviation Systems Command
St. Louis, MO

THE FIRST QUESTION usually asked by someone being briefed on Project OLR, U.S. Army Aviation Systems Command's (AVSCOM's) aircraft modification work order (MWO) application program, is "What does 'OLR' stand for?" Considering the Army's penchant for acronyms, this is a fair question. No, it does not mean "Organizational Logistical Repair" or even "Our Last Resort." It is only a computer-assigned project code with no hidden meaning. My apologies to the budding acronym makers among you.

A little MWO history should give a proper perspective of OLR. Before 1976, owning units and activities were responsible for applying MWOs. AVSCOM designed, purchased and stocked the MWO kits and published the MWO (application instructions). Owning units reviewed Department of the Army (DA) Pamphlet 310-7, determined which MWOs were applicable to their assigned aircraft, requisitioned the kit (or submitted a work order to their direct support unit or general support unit for higher level MWOs) and reported the completed MWO to AVSCOM.

The effectiveness of this system was spotty at best. Some units were not as conscientious as others about modifying their aircraft. Some modifications were not popular and were not installed on every applicable aircraft. As a result, aircraft did not receive the MWOs they were supposed to, MWO kits were lost and aircraft configuration management suffered.

To correct this situation, DA gave total MWO responsibility, including application, to AVSCOM. Project OLR was created to carry out this newly assigned mission of *applying* MWOs to user aircraft. Thus, Project OLR became the mechanism by which AVSCOM ensures each aircraft in the Army's fleet is configured with the most current modifications for improved mission capability and safety.

Initially, the personnel to run the OLR sites were borrowed from the host installation on temporary memorandums of understanding. There was no real continuity in the assignment of these personnel, and they really did not work for AVSCOM. Therefore, this arrangement proved less than satisfactory. AVSCOM began staffing OLR sites with full-time project officers and quality assurance representatives (QARs). These AVSCOM representatives are DA civilians responsible for administering the program and controlling Department of Defense contractor field teams in applying MWOs according to schedules coordinated with aircraft users (Active Army, National Guard and the Army Reserve). Each OLR project officer was assigned a geographical area of responsibility. There are seven OLR sites worldwide. Figure 1 shows the location of each site and its assigned area.

Project OLR uses contractor field team (CFT) personnel to actually apply the MWOs. The contract is awarded by the U.S. Air Force. This contract is used by all the military services and other government agencies (i.e., Federal Bureau of Investigation, Customs Bureau and Forestry Department). The Air Force negotiates the basic contract and determines the hourly rates the Government will pay for each particular skill (e.g., mechanical, electrician, etc.). Because of this wide use by other services and agencies, the rates for each skill are much lower than if AVSCOM contracted for the service on its own.

Using the Air Force CFT concept enables the use of the Air Force's experience in monitoring contractor performance to ensure quality work. Our greatest concern in Project OLR is maintaining the highest level of workmanship on every MWO application. The use of the Air Force field team concept gives us the basis of an excellent quality assurance program from which to start. The maintenance of a high level of quality in Project OLR is a team effort, with the CFT, the OLR project officer/QARs and the customer (you, the aircraft user) each playing an important part.

First, the contractor must, according to contract provisions, maintain a "quality system" approved by the Air Force. This system consists of all of the work procedures, inspection procedures, recordkeeping and inspector certification practices that the contractor uses to make sure that all work is performed properly to specification. An audit trail of mechanic and inspector actions is maintained. It roughly compares to The Army Maintenance Management System as described in DA Pamphlet 738-751; however, in most respects, it is much more comprehensive.

For example, the CFT uses a contractor workbook to record all actions involved in applying an MWO. This workbook is essentially a detailed, step-by-step breakout of the MWO instructions. Unlike the DA Form 2404, however, the workbook has separate signature blocks for the mechanic, the contractor inspector and the government inspector for each step (i.e., removal, modification, installation, checks, etc.). For critical steps, the mechanic must have the work checked by the government inspector before proceeding to the next step. The workbook must be retained by the contractor, in its original form, for 60 months (10 times longer than DA Form 2404s). A key point of this system is that the contractor remains liable for the quality of workmanship on any modification even after the aircraft is returned to the user.

Second, government surveillance of the contractor's quality system is what keeps the system honest. Under contract provisions, the contractor is constantly liable for the quality of workmanship. Therefore, 100-percent inspection of every application is not required. (Nor is it possible for the AVSCOM project officer or QAR to inspect all of the thousands of MWOs applied each year.) What is necessary is

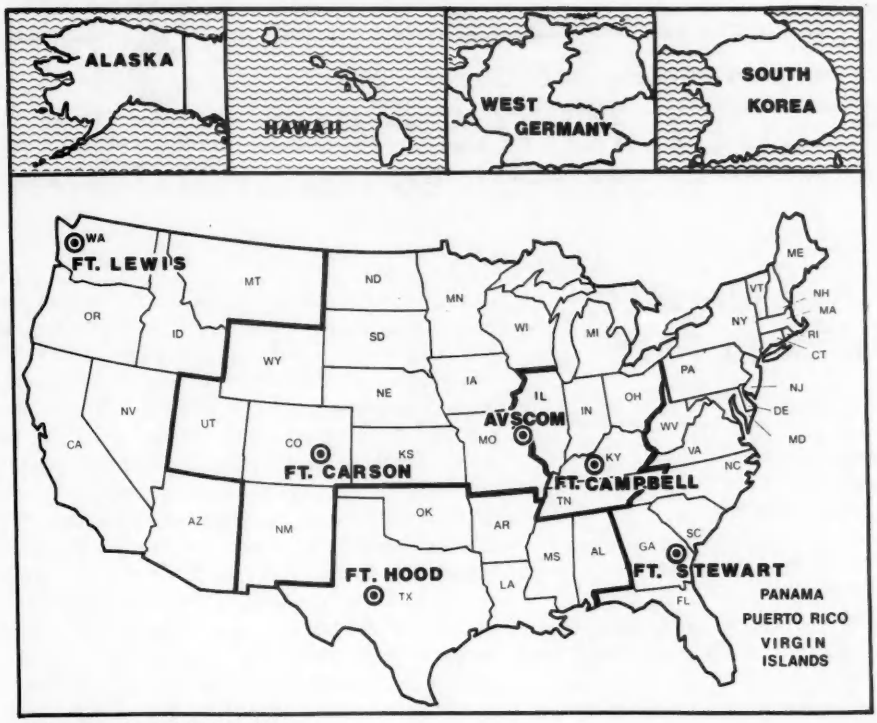



**FIGURE 1: AVSCOM OLR sites.**

constant checking to ensure that the contractor's approved system is working.

The AVSCOM project officers and QARs at each OLR site accomplish this by a combination of tasks: physical inspection of sample aircraft; unannounced spot-checks of CFTs applying MWOs at user locations; and, most important, delegation of temporary authority, to users, to act as remote QARs while the CFT is at their location installing MWOs. You, the user, have the final say on the quality of MWOs applied to your aircraft.

The contractor has a vested interest in doing it right the first time. If you are not satisfied with the work, the contractor must do it over. If he has to do it over, he does not make any profit. Because of this, the leadman (supervisor) of any CFT sent by Project OLR is normally very willing to correct any discrepancies noted by the customer. Any situations not resolved to the user's satisfaction should be brought to the immediate attention of your supporting OLR project officer. If you have a problem with the CFT, tell us about it right away! We will get it fixed.

Another lesser known aspect of Project OLR is its limited depot level, onsite repair capability. In certain instances, an OLR CFT can be dispatched to do onsite depot level repairs. If you have a candidate requiring repair above your level, submit your normal estimated cost of damage report with the commander's request for onsite repair to Commander, AVSCOM, ATTN: AMSAV-MDP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. Depending on the situation and specific repair, response time can be as short as 2 weeks from the date we receive your request. The use of CFT is another option to satisfy your requirement as is the dispatch of U.S. Army Depot, Corpus Christi, TX, personnel (figure 2).

In short, Project OLR is prepared to help you keep your aircraft ready to fight with the latest improvements in combat aviation technology. Project OLR is an integral part of the Army Aviation team.

**FIGURE 2: Points of contact.**

**HEADQUARTERS AVSCOM**
**Leonard E. Yates**
**AUTOVON 693-3961/3962**
**Commercial 314-263-3961/3962**

**REMOTE SITES**
**Dale D. DeRoia, Ft. Stewart, GA**
**AUTOVON 971-5402/5931**
**Commercial 912-352-5402/5931**

**Jim Simon, Ft. Campbell, KY**
**AUTOVON 635-7511/7538**
**Commercial 502-798-7511/7538**

**CW4 James L. Nance, Ft. Hood, TX**
**AUTOVON 737-3511/4505**
**Commercial 817-287-3511/4505**

**Jack Kelly, Germany**
**AUTOVON Mannheim Military 2131-7481**

**Charles Landherr, Ft. Carson, CO**
**AUTOVON 691-5077**
**Commercial 303-579-5077**

**James Bush, Ft. Lewis, WA**
**(includes Alaska and Hawaii)**
**AUTOVON 357-5761/3836**
**Commercial 206-967-5781/3876**

**John P. Evans, Korea**
**AUTOVON 253-7108/7109**

# Altitude Over Airspeed Versus Airspeed Over Altitude

**Mr. Wilburn James**
Literature Review Branch
Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

THE ARGUMENT OF which is best—*altitude over airspeed or airspeed over altitude*—is as old as the first flight in the Wright flyer.

The first fatal crash in an airplane occurred in 1908 in a Wright pusher-type airplane piloted by Orville Wright as he was instructing First Lieutenant (lLT) Thomas E. Selfridge, U.S. Army. A contributing cause was a failure in one of the propeller blades. Consequently, sufficient flying speed was not maintained and the airplane crashed, seriously injuring Orville Wright and killing 1LT Selfridge. Ironically, the first 14 airplane crashes resulted in 9 fatalities. Most, or all, of these crashes were caused to some degree by loss of sufficient flying speed.

During the course of fixed-wing flight training, various types of takeoffs and climbs are taught and for a very good reason. There is a definite need for the pilot to know how to perform a minimum-run takeoff and to climb over obstacles immediately after liftoff, or to climb over hills or surrounding terrain.

Many may think that Vy, the velocity of the best rate of climb, is the only way to go because that is what is taught in flight school and that to gain altitude is the most important thing. However, climbout at Vy is not necessary for every flight. For routine operations, when runway length, obstacles or surrounding terrain are not problems, it may be desirable to takeoff and climbout at a pitch attitude that provides better forward visibility and a higher airspeed. This reduced angle of climb and resulting higher airspeed allow the reduction of power much sooner after takeoff and greatly reduce the high noise level. The early reduction of power results in increased fuel economy and prolongs engine life. It also allows more time for reaction in the event of an unexpected engine failure.

If climbing at Vy, which is at or near Vyse (safe single engine climb speed) and an engine fails, the pilot has a problem. The pitch attitude that he has for the Vy climb is considerably steeper than the pitch attitude he will need to maintain Vyse. The sudden loss of power on one engine results in a significant loss of effective thrust (usually in most light aircraft 70 percent to 80 percent). The greatly induced drag caused by a windmilling propeller and an out-of-balance or trim condition will rapidly decay his airspeed. He may find himself at an airspeed that is below Vyse with insufficient power on the remaining engine to regain Vyse without lowering the nose and experiencing an altitude loss. If a pilot is flying over uneven terrain, especially at night or on instruments, his margin of safety is greatly reduced because of this airspeed and altitude loss.

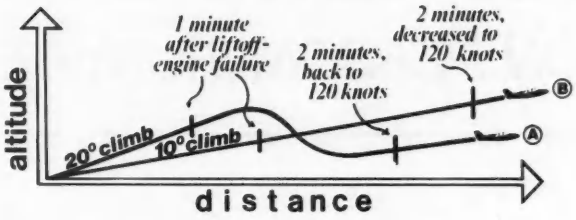
A climb may be performed at about the same pitch attitude with both engines operating as if the pilot were established in a single-engine climb. The airspeed will be greater and the rate of climb will be less than if he were climbing at Vy, the best two-engine rate. A climb at a reduced angle and higher airspeed will require little, if any, pitch attitude change as airspeed diminishes because of the loss of an engine. This allows more time to devote to an engine failure versus trying to regain lost airspeed and altitude.

The following hypothetical situation will give some insight as to the problems that exist under the most trying circumstances:

Imagine two identical aircraft taking off simultaneously on parallel runways (figure 1).

- Aircraft A lifts off and begins a climb at Vy (120 knots).
- Aircraft B lifts off and begins a climb at cruise climb airspeed (140 knots).
- Assume that both aircraft experience an engine failure at 1 minute after liftoff.
- Since aircraft A is climbing at Vy, which is at or near Vyse, the pilot must discontinue the climb and enter a de-

**FIGURE 1**




☐ Aircraft A and B experience an engine failure at 1 minute after liftoff.

☐ Aircraft B must discontinue climb and enter a descent to regain lost airspeed.

☐ Aircraft B continues to climb as airspeed decreases.

☐ At 2 minutes after liftoff, aircraft B has gained more altitude and traveled farther than aircraft A.

*NOTE:* This diagram is for illustration purposes only and is not drawn to scale.

scent to regain single-engine climb speed Vyse.

• Since aircraft B is climbing at a higher airspeed, the pilot can continue climbing at the same attitude (angle) with no problem with aircraft control.

• At 2 minutes after takeoff, aircraft B has gained more altitude and traveled farther than aircraft A.

The advocates of altitude over airspeed are more comfortable with the extra altitude. They tend to overlook Sir Isaac Newton's laws of motion. To demonstrate Newton's second law of motion, *the law of acceleration*, try this maneuver in your aircraft (figure 2):

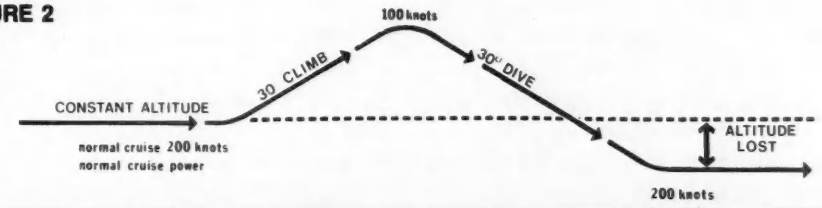
Maintain cruise airspeed, cruise power and straight-and-level flight. Note your cruise airspeed; for example, 200 knots and your altitude. Now smoothly raise the nose to 30 degrees pitch attitude; hold this pitch attitude constant until your airspeed decreases by one-half (50 percent) 100 knots. At this time, lower the nose smoothly (at the same rate that you raised the nose) to 30 degrees nose down. When your airspeed increases to 200 knots, note your altitude. You may be surprised to find that your altitude is somewhat lower than when you entered the climb. This demonstration should show you that, because of the laws of acceleration, it takes more altitude to regain lost airspeed versus the altitude you gained; i.e., if you have extra airspeed, you can trade it off for altitude and come out ahead versus trading altitude to regain lost airspeed, when you lose.

Using this technique, i.e., maintaining about the same pitch attitude or climb angle while analyzing the emergency situation and taking appropriate action, will ensure safe aircraft control. After all emergency action steps have been completed, you will find that you are still climbing and the airspeed will be Vyse. A little practice with this at a safe altitude will quickly show you the pitch attitude or angle of climb for your aircraft.

Orville once said to Wilbur, "There are three things that cause an airplane to fly and they are (1) airspeed, (2) airspeed and (3) airspeed."

Think about it, which do you prefer when losing an engine right after takeoff—altitude or airspeed?

**FIGURE 2**




*DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5208; or call us at AUTOVON 558-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or Commercial 205-255-6487 and leave a message.*

# AVIATION PERSONNEL NOTES

**Aviation Career Incentive Pay (ACIP)**

Queries from the field indicate there is a recurring confusion regarding ACIP. This results in part from the lack of a single source document that clearly spells out ACIP from A to Z and is easily accessible at the individual aviator level. Aviators having detailed questions about their specific flight pay entitlements should consult their local finance and accounting officer. The critical points of ACIP are reviewed below and are followed by a list of references required for an exhaustive treatment of the subject.

An officer (except a flight surgeon or other medical officer) who is entitled to basic pay, holds an aeronautical rating or designation and is qualified for aviation service, is entitled to continuous ACIP for the first 12 years of aviation service without regard to monthly performance requirements. Entitlement thereafter depends on the performance of prescribed operational flying duties, as follows:

• On completion of 12 years' aviation service, an officer must have performed 6 or more years of operational flying to be eligible to receive continuous entitlement until the 18th year (12th year review gate).

• On completion of 18 years' aviation service—must have performed at least 9 but less than 11 years of operational flying to be eligible to receive continuous entitlement until the 22d year of total Federal officer service (TFOS). An officer is eligible to receive continuous entitlement until the 25th year of TFOS if 11 or more years of operational flying have been performed (18th year review gate).

• Entitlement to ACIP terminates for commissioned officers on completion of 25 years' TFOS. The U.S. Army Finance and Accounting Center automatically will terminate flight pay under this condition.

• A commissioned officer, below the pay grade 07 with more than 25 years of officer service, who is qualified for aviation service and required by competent orders to perform operational flying duties is entitled to monthly (conditional) ACIP for the performance of minimum flight requirements (currently 4 hours per month). Finance regulations are such that it is not assumed that flight will occur in any given month and thus payment made in advance for flight. Payment is made only for flight performed. Officers in this category do, however, have a 3-month grace period and may use excess flight time from the preceding 5 months to qualify for the 4-hour per month minimum.

• Flight surgeons and other medical officers are not entitled to continuous ACIP credit. They are entitled to monthly ACIP credit when they are performing operational flying duties under competent orders and the performance of minimum flight requirements has been met.

• Officers who fail to meet the requirements of the gate system are entitled to monthly ACIP only while performing operational or proficiency flying per competent orders. Further, the officer must perform the minimum aerial flights. It is both possible and permissible for an officer to miss the 12th year review gate (have less than 6 years of operational flying time) and to regain continuous entitlement provisions at the 18th year review gate.

There is another category of aviators restricted to limited cockpit duty. Colonel (06) aviators in nonoperational aviation positions and general officers who hold a U.S. military aeronautical designation may perform these limited cockpit duties.

Limited cockpit duty permits those officers whose duties inherently require the performance of cockpit duties on a limited basis to operate military aircraft. Limited cockpit duty is not intended to permit these officers to perform pilot duties independent of the requirements of their duty position.

Requests by such officers will only be considered for approval to perform the following duties in conjunction with their duty assignment:

- Evaluate operational flying procedures.
- Review flight training effectiveness and performance.
- Participate in flying exercises or test programs.
- Gain familiarity with selected aviation systems and equipment.

Officers performing limited cockpit duties will not receive operational flying duty credit or ACIP unless otherwise entitled by the Aviation Career Incentive Act of 1974. It may be possible to qualify for hazardous duty incentive pay for flying while performing limited cockpit duties.

The following regulations relate to ACIP:

- AR 95-1, "Army Aviation: General Provisions and Flight Regulations."
- AR 37-104-3, "Military Pay and Allowance Procedures, Joint Uniform Military Pay Systems (JUMPS-Army)."
- AR 570-1, "Commissioned Officer Aviation Position Criteria."
- AR 600-106, "Flying Status for Nonrated Army Aviation Personnel."
- Department of Defense Military Pay and Allowances Entitlements Manual.

### Aviation Maintenance Expands to Incorporate Avionics Maintenance

On 23 March 1988, Lieutenant General Allen K. Ono, the Deputy Chief of Staff for Personnel, approved the merger of career management field (CMF) 28 and CMF 67. This decision culminates a 5-year effort to bring all aviation maintenance under one CMF. Although there will be little or no effect on the way maintenance is performed because of this decision to merge the two fields into one, there are many personnel changes associated with the decision.

Avionics personnel presently hold military occupational specialty (MOS) 35K, 35L, 35M, 35P and 35R. The approved change will cause these MOSs to become 68N, 68L, 68Q and 68R, respectively. Another major change will align career progression of avionics personnel with that of CMF 67. The current progression is capped to 35P (from 35K, L, M and R) at staff sergeant (SSG). The new structure will progress from the base MOS through SSG and cap at sergeant first class (SFC) 68P40. All sergeant major and master sergeant (MSG) 35P50s will be reclassified to 67Z50 as a result of the merger.

All reclassification will take place in October and November 1989. The positions will be recorded in table of organization and equipment and table of distribution and allowances units in the July to September 1989 change window. The 1988 MSG promotion board considered avionics soldiers for promotion using their new MOS designations as will the SFC promotion board to be held in October 1988.

**1988 Aviation Logistics and Maintenance Commanders Conference**

**The United States Army Aviation Logistics School is sponsoring the second annual Aviation Logistics and Maintenance Commanders Conference to be held at Ft. Eustis, VA, from 17 to 21 October 1988. About 100 aviation logisticians from Europe, Korea, Panama and the continental United States are scheduled to participate. This conference will provide a forum for discussion and exchange of information and an update and review of aviation logistics issues. It will also provide input to the Aviation Commanders Conference to be held at Ft. Rucker, AL, in December 1988. Panels will be formed to discuss the following issues: doctrine, organization, equipment, maintenance management/operations, training and proponency. For more information call Major Payne at AUTOVON 927-6566, Commercial 804-878-6566.**

# Innovative Logistics Support: *Forward Support for Joint Task Force Bravo*

The opinions expressed in this article are those of the author and do not necessarily reflect the views of any Department of Defense agency.

**Mr. Don L. Hamblin**
U.S. Army Forces Command
Fort McPherson, GA

THE 82D AIRBORNE Division was making headlines in 1983. At the same time the 101st Airborne Division (Air Assault) was building the foundation for what is now called the Joint Task Force Bravo (JTF-B) forward support package (FSP).

When the 101st arrived for A Haus Tara II, Palmerola Air Base, Honduras, was the training base for the Honduran Air Force. Located about 8 miles from the village of Comayagua, the air base looked very little like the back drop it has since become for the news media in Central America. A tent city sprang up for flight crews and support personnel. Life was three MREs (meals ready to eat) daily, and phased maintenance in a cloud of volcanic dust. Water and fuel were trucked in to wash and "feed" the aircraft; repair parts were flown in by air lines of communication to replenish the deployment package. Such was life at "Camp Black Jack."

The requirement for providing rotary wing support for the region did not end with redeployment of the 101st. What did end was the ability to commit the assets of an entire air assault division to a temporary "ash and trash" administrative mission. International diplomacy decided both the amount of available "real estate" and the maximum number of soldiers who could provide the services. The question became, with only a couple hundred soldiers, how can we do the jobs below of:

- A corps support command.
- A nondivisional aviation intermediate maintenance (AVIM) company.
- A "lift" company.
- A CH-47 Chinook company.
- An air ambulance detachment.
- A supply support activity authorized stockage list (ASL).
- Prescribed load lists (PLLs).
- An aviation battalion headquarters.

The U.S. Army Forces Command (FORSCOM) aircraft logistics office dug into all the available lessons learned and afteraction reports to try to find the easy answer. It didn't work. For once, we couldn't copy what somebody else had done. FORSCOM headquarters had to innovate to get the job done. The first step was to let the operators task III Corps to develop the perfect task force to do the job. It seemed easy at the time; however, another question came up, "What do you guys do around here anyway?" Pushed to the wall, we had to earn our keep.

Midway through the first JTF-B rotation, onsite visits to Palmerola started; that meant civilians living and working with the soldiers to learn the real story of what was needed. Actions started to design a truly task organized aviation logistics support structure, which was anything but business as usual. Business as usual could no longer apply since we no longer had a doctrinal organization or mission.

Having an AVIM company, an installation aircraft maintenance activity and a UH-1 Huey and CH-47 aviation unit maintenance (AVUM) platoon works fine when you're not far from home, but that support couldn't be afforded with the new nonstandard restrictions. A Chinese restaurant approach—one from column A, one from column B, etc.—was taken. A slice of AVIM, AVUM, PLLs, ASL shop stock and the FORSCOM aviation intensive management item account was mixed into a "JTF-B lo mein" called the FSP.

The rules of logistics support had to be modified. The concepts of "we've always done it this way" had to change. Some responsibilities grew while others shrank. Talk to the troops, talk to the wholesale. Above all, make sure that what was done was smart. Procedures and policy were developed on the ground and coordinated for approval. More than once the FORSCOM deputy chief of staff for logistics came to Palmerola to approve innovative procedures for troops in the trenches.

All these pieces had to come from somewhere. It is a well-known fact

that the Army doesn't have any extra equipment or repair parts. Take a little from here, a little from there and beg everything possible from the wholesale system. The idea was to save our commitment in parts and equipment by not having our assets pass each other in the transportation system. Consolidating any "fat" in a forward deployed location seemed better than always keeping two divisions short of their "lean."

The first significant action was to consolidate some of the FORSCOM operational readiness float UH-1 aircraft at Palmerola. No longer were continental United States (CONUS) divisions "wasting" aircraft in the transportation system. With these same aircraft always pulling the mission, repair parts could be forecasted and requisitioned before their need. Ground support equipment and tools had started to grow. "Don't strip the divisions" had become the rule rather than the hollow promise felt all too often.

The largest savings came in personnel. Much of the necessary overhead in corps aviation logistics management wasn't needed to support the fewer number of aircraft. The consolidation of AVIM and AVUM, along with PLL and ASL, cut the number of required people dramatically. No longer did we have AVIM or AVUM tasks, now we merely fixed broken aircraft. No longer was there a need to have an ASL with only one customer. A consolidated repair parts stockage could be better tailored to support the new organization. Reducing layers of stockage reduces the requirements for storage, materiel handling equipment, recordkeeping and personnel. When you develop personal computer based programs to perform arithmetic functions, you reduce the requirement for supply clerks.

Building the FSP repair parts stockage list became an important challenge. For this we started with a PLL for UH-1s from the 1st Infantry Division, along with a specialized slice of their ASL and a PLL for CH-47 from the 210th Aviation Brigade. Then came more modification. Provisions had to be made for the requisition transmission link with CONUS item managers possibly being cut during a surge in missions. This form of requisitioning required more onsite visits with deployed maintenance personnel and wholesale item managers to determine levels for the "one's and two's" of the "nuts and bolts" that can hold an aircraft as close to the ground as a one-half million dollar engine. The FSP stockage list became more nonstandard from business as usual PLL/ASL management.

Introduction of UH-60 Black Hawks into the task force called for even more high-level coordination. An agreement was made with the UH-60 program manager's office to provide a standard "push package" of Black Hawk parts for the FSP. U.S. Army Aviation Systems Command (AVSCOM) support was impressive. The AVSCOM commander, Major General Richard Stephenson, personally accompanied the package to Palmerola. Again, soldiers on the ground were reminded of their importance.

The same modification process began again. By this time, however, a procedure had been developed to handle the process. Each rotation had to review the entire FSP to ensure the stockage was still consistent with supported aircraft and mission requirements. The task force maintenance officer, supply officer and commander had to approve any changes to the stockage. The FORSCOM aviation supply representative for the Aviation Resource Management Survey (ARMS) team would then review the list at each rotation. Basic guidelines included stocking only smallest quantities of any item and watching for that one "nickel-dime" item that holds the $8 million aircraft on the ground.

All this reduction sounds good on paper. To make it work, however, requires actions that can't be measured or requisitioned. Soldiers in the field have to work closely with the logistics assistance representatives provided from the U.S. Army Materiel Command, logistics assistance office. The FORSCOM aircraft logistics office has to remain proactive and maintain a responsive communications line so that an "honest broker" is always available. Onsite visits still go on once during each rotation when the troops change over, and once with the FORSCOM ARMS team staff assistance visit, at the midpoint of each rotation. Innovations at each level of logistics and command must be documented and consolidated during these visits. There is no free lunch.

A truly operational test of the FSP concept was something nobody ever wanted. However, during the JTF-B support to Exercise Golden Pheasant, it happened. Systems problems in the communications link with the wholesale community stopped the requisition flow to the national inventory control points for almost 60 days. The supply pipe line almost emptied. Task force maintenance operations had to depend on the FSP support base. The bottom line was that, while flying more than four times CONUS flying hours, not mission capable supply rates were within a couple of percentage points of the published Department of the Army goals. It wasn't a pleasant way to test the concept; however, forward stockage of critical repair parts proved to be the buffer needed to maintain operations.

Camp Black Jack no longer looks like it did back in 1983. No permanent structures exist there; however, the temporary assets are much better suited to good logistics support. Once in a while a tourist comes through who remembers the way it used to be. There is some value in nostalgia; however, we should be thinking, "What can we do to make it better for the next rotation?" War stories are only good when we can learn from our mistakes. This is not the way we plan to fight wars. However, we have proven that the American soldier can find a way to "make it happen" and is not always satisfied with "doing it the hard way."

# A Maintenance Chart That Works

**Captain Timothy J. Edens**
Captain Edens was assigned to Aviation Officer Advanced Course 86-3, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

WHEN WAS THE last time you saw or used a maintenance chart that actually helped you? I don't mean the kind of chart that was only filled out for the inspector general or aviation resource management survey inspection. You know, the "pretty colored" charts that make it appear you are busy and right on top of the maintenance situation. I mean a useful chart that helped you in making day-to-day maintenance decisions.

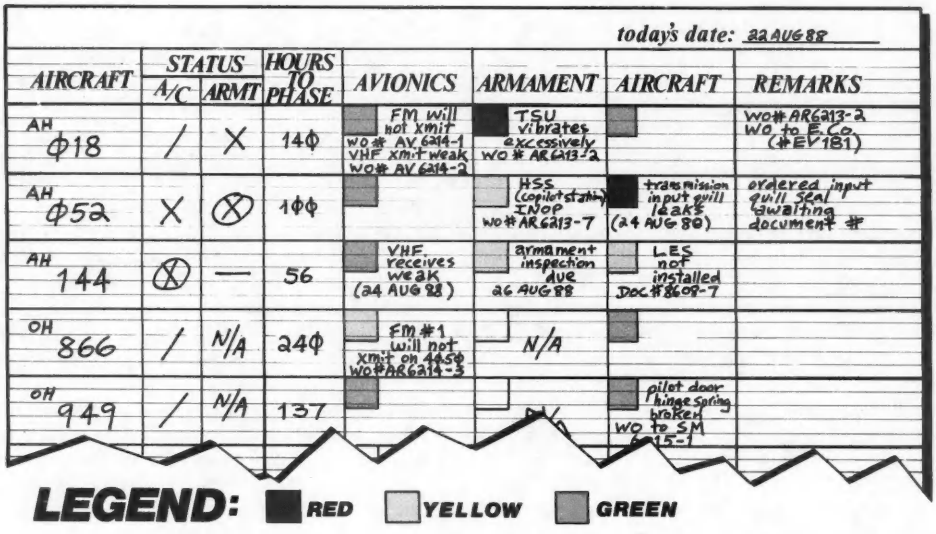
During my assignment in A Company, lst Aviation Battalion (Combat), Ft. Riley, KS, I tried several charts in my attack helicopter platoon. With the two types of aircraft (OH-58 Kiowa and AH-1S Cobra), I found it difficult to track my maintenance without scrubbing daily each logbook myself—a time-consuming chore. There had to be a more efficient way of doing business—a way that would show where to focus my maintenance efforts without getting lost in dash 12s, dash 13s and dash 14s.

My last company commander introduced a maintenance chart similar to what he had used as a cavalry troop commander in the 2d Armored Cavalry Regiment. He expected it to be filled out and updated daily. We had to be prepared to brief it to him at any time and always at our weekly maintenance meetings. At first, we all felt it was merely a harassment technique. After we used the chart for several weeks, however, we could not help but notice the improvement in our maintenance status.

The real beauty of this maintenance chart is its simplicity and practicality. An example of the version I used is shown below.

As you can see, it is an easily adaptable chart, one that can be used in any type of unit—aviation, armor, transportation or whatever. In fact, it is based on a chart that had been used in an armored cavalry regiment.

The columns are pretty much self-explanatory so I will discuss only the status column, color codes and remark column. The /, X, ⊗, and – symbols, of course, are the standard Army Aviation status symbols. The colored



blocks are used to tell immediately at what level of readiness a particular system of each aircraft is currently. Red denotes a completely nonfunctional system. Yellow indicates a degraded system. The degradation reduces the aircraft's capabilities but does not interfere with mission accomplishment. Finally, green denotes a system that is 100-percent mission capable. These codes are nearly synonymous with fully mission capable (FMC), partially mission capable (PMC) and nonmission capable (NMC). In essence, this chart gives the platoon leader or joint table of organization and equipment company commander a visual representation, readily available, of his aircraft logbooks. The color codes make it quite simple to see where the platoon should focus its maintenance efforts; these codes make tracking of progress and mission readiness easier.

The chart, as I said, is easily adaptable to different units. How the commander determines FMC (green), PMC (yellow) and NMC (red) is completely flexible. For instance, in my unit, AH-1S aircraft, to be carried as FMC on the chart, had to have 100-percent functionable weapons systems, not just the TOW missile system. The chart shows vividly the difference between a flyable aircraft and an FMC aircraft. This flexibility allows the commander to tailor his charts to his standards and mission.

The remarks section of the chart is used for reporting any additional information on aircraft systems status. More important, it is used to show where the platoon stands in performing the required maintenance to improve each aircraft's status. For example, this is where work order numbers or parts request numbers would be noted.

As I have shown, this chart is not revolutionary or original. However, it was most effective in my last unit. The impact of command involvement on this effective technique cannot be overstated. Likewise, this chart provides a vehicle to facilitate effective command involvement.

# BOLTS

The U.S. Army Materiel Command (AMC) has identified an Armywide problem concerning—

- Misapplication of bolts.
- Improper mixing of different grades of bolts in parts bins.
- Lack of awareness of bolt grades on the part of supply clerks, mechanics and their supervisors.

Corrective action is being taken to—

- Explain to the field the different kinds of bolts in existence and criticality of application.
- Notify users of critical applications requiring specified bolts.
- Identify manufacturers whose bolts have not met contractual requirements.
- Automatically regrade to the lowest strength rating those bolts whose actual grade is uncertain.
- Limit local purchase of untested bolts and eliminate local purchase of bolts destined for critical applications.

"The Army needs to purge its bolt bins," according to Mr. Jerry Stahl, Assistant Deputy Chief of Staff for Product Assurance and Testing, AMC. Furthermore, Mr. Stahl says, "Equipment scheduled for maintenance will be inspected and bolts in critical areas will be checked to ensure the bolts called for in the technical manual are being used."

The Army first identified it had received bolts that did not conform to contract specifications when it was discovered that 8.2 grade bolts were being supplied instead of 8.0 grade bolts.

Standard 8.0 and 8.2 bolts have the same tensile strength (150,000 pounds per square inch), but the 8.2 bolt should not be used for applications exceeding 500 degrees F.

Last year, the Army removed nonconforming bolts from the wholesale supply system. The problem was bigger than initially believed, and officials realized they should have educated the field on the problem.

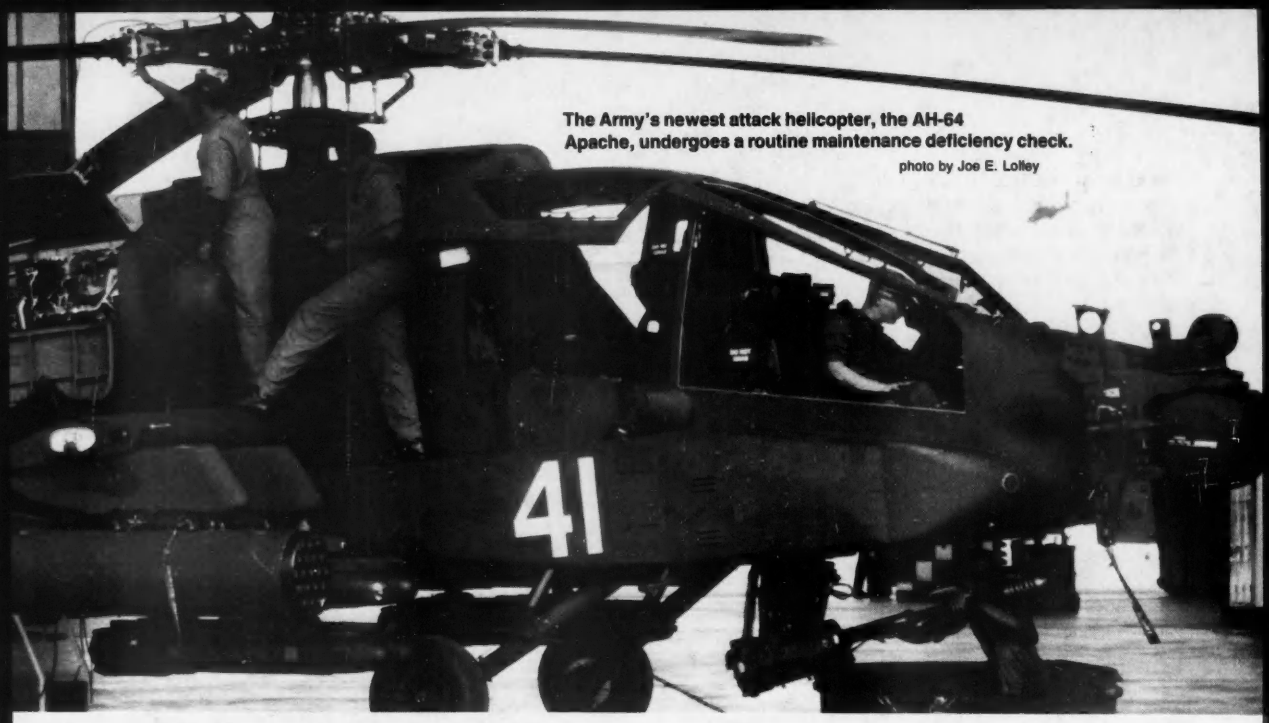
"Where we were most remiss was in not fully educating the field as to difference in bolts and the criticality of their application," Lieutenant General Jerry Max Bunyard, Deputy Commanding General for Research, Development and Acquisition, AMC, told Congress.

The problem does not significantly affect Army-level operational readiness except for the time required to inspect and repair as necessary. There will be some degrading in maintenance at unit level until all bolt bins are purged and replaced with conforming bolts.

Army officials emphasize that the bolt problem—which was brought to the Army's attention through the government industry data exchange program—is in the private sector, too. It's not just an Army problem. It is a nationwide problem as well.

Testifying before Congress, LTG Bunyard said. "We found we were dealing not just with bolts, but contractor integrity and testing accuracy and reliability."

Soldiers with questions about bolts or their application, or those who think they have a problem that is caused by bolts, are asked to contact their logistics assistance representative. LTG Bunyard stated, "Readiness is our business. We're totally committed to providing quality equipment to the soldiers, whether it is a bolt or a tank."




**The Army's newest attack helicopter, the AH-64 Apache, undergoes a routine maintenance deficiency check.**

photo by Joe E. Lolley

# MAINTENANCE MANAGEMENT UPDATE

**CW3 Larry Cornell, U.S. Army, Retired**

CW3 Cornell was assigned to the Directorate of Combat Development, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

EIR, QDR, DR. Do you recognize these acronyms? If not, then you may not be making use of a valuable tool incorporated into the Army Maintenance Management System. An equipment improvement report (EIR), or quality deficiency report (QDR) (Standard Form (SF) 368), is the best resource that the user has to inform the equipment program manager at the U.S. Army Aviation Systems Command (AVSCOM), the U.S. Army Missile Command, the U.S. Army Armament Munition Command or the U.S. Army Communications-Electronics Command about a deficiency or potential problem with equipment or repair parts. Both EIRs and QDRs are referred to as deficiency reports (DRs) in this article. If you think you have received defective parts or equipment, send a DR to inform one of these commands.

Conditions that require submission of DRs are numerous. Instructions for preparing and sending an SF 368 or an electronic message are contained in DA Pamphlet (Pam) 738-751, "Functional Users Manual for the Army Maintenance Management System—Aviation," for aviation-managed equipment. DA Pam 738-750, "The Army Maintenance Management System," contains instructions for separately managed equipment located on aircraft (i.e., weapons or avionics). The regulations for the Army's quality programs are Army Regulation (AR) 702-7, "Reporting of Product Quality Deficiencies Across Component Lines," and AR 702-7-1, "Reporting of Product Quality Deficiencies Within the U.S. Army." The two reporting categories for all DRs are I and II.

A category I DR is a deficiency report describing an unsafe condition or procedure for an aircraft, component, repair part or technical publication. A category I report can be submitted when incorrect or missing data found in the technical manual (TM) would cause a dangerous situation. Otherwise submit a DA Form 2028, Recommended Changes to Publications and Blank Forms, to correct the error. For a category I situation, the application is to the airworthiness, and failure could be expected to cause loss of the aircraft and/or serious injury to the aircrew or ground personnel. A category I DR must be sent by message within 24 hours (the clock starts when the deficiency is discovered). A category I DR initially may be transmitted by telephone, followed up with a message.

A category II DR will be submitted for any deficiency that does not meet category I standards. An SF 368 will

**Performing scheduled maintenance checks on the UH-60 Black Hawk pays high dividends.**
*photo by SSG Columbus Frazier*

be used for a category II DR and must be submitted within 5 days of discovering the fault. The SF 368 can be handwritten, but it must be readable and include all correct information required by the DA Pam. A category II can be submitted on anything from low-quality workmanship during manufacture, or modification, to equipment failure due to environmental conditions. If you are not sure about the requirements for sending a DR, read the instructions outlined in DA Pam 738-751, paragraph 2-13 through 2-16. If you are still uncertain, seek assistance from a technical inspector in the quality control (QC) shop. If you have a recurring problem, send a new DR emphasizing submission of other reports on the same problem.

Unit commanders should know that they are responsible for ensuring DRs are completed and forwarded to the appropriate agency. Requirements in AR 95-18, "Safety of Flight Messages," and AR 385-40, "Accident Reporting and Records," relate DRs to safety-of-flight (SOF) incidents and to PRAMS (preliminary reports of aircraft mishaps). Since the above listed ARs are safety related, the unit safety officer will be able to help you.

The Army publishes a quarterly Technical Bulletin 43-0001 series, EIR Digest, to disseminate technical information to aircraft maintenance activities. The Digest also contains solutions and/or actions to be taken to correct equipment faults reported through DRs, DA Forms 2028 and advanced information on proposed modification work orders. The information contained in this Digest may be used until applicable TM changes are distributed.

When a DR is sent to AVSCOM (the sender forwards the original copy only, no duplicates), the customer feedback center (CFC) receives it. The CFC conducts daily meetings with representatives from maintenance, engineering and product assurance. Each DR is reviewed for flight safety, and screened to ensure that it is readable, accurate and complete. Previous history of similar problems is reviewed, and the DR is assigned to the appropriate action office.

A DR that deals with contractor conformance to design specification will be assigned to a quality assurance specialist in product assurance. A design deficiency will be handled by an engineer or an equipment specialist involving one of three major functional areas: accessory, power plant/propulsion or airframe. The appropriate action office in maintenance, engineering or product assurance will decide to have the exhibit processed for teardown analysis or turned in through normal supply channels.

The CFC will provide an acknowledgement letter to inform you which office the DR has been assigned to. The action office will provide the sender with disposition instructions for any exhibits. New procedures have been initiated to include exhibit shipping instructions in the acknowledgement, when possible. The CFC sends the acknowledgement within 1 week of receipt of the DR. Accounting for mail, distribution and processing time, you should receive your acknowledgement within 30 days after you send your DR. If you have not received an initial response within 60 days of sending your DR, contact the CFC for information. The CFC is working to improve response time and to improve procedures to trace exhibits that have been shipped.

The AVSCOM logistical assistance representatives (LARs), located at major installations, may be able to assist you in getting answers about releasing exhibits sooner. The CFC and LARs also have packaging stickers to place on DR exhibit containers to help identify teardown analysis exhibits.

Many programs are affected as a result of DR findings. SOF messages are issued. Items are improved, redesigned or modified as appropriate. Publications are revised and procedures are changed. If a contractor does not improve faulty production processes, his contract can be terminated and an alternate source obtained to manufacture the part.

Deficiency reports are submitted by anybody who finds a deficiency or has a recommendation to improve parts, components or systems. The DR must be legible and have all the required information in the correct block of the SF 368. It is not being checked for grammar, so do not hold up a report for fear of misspelled words. Commanders, continue to monitor your unit's use of DRs to send information to AVSCOM and to enhance the Army Aviation Safety Program. Protect the exhibits and process them immediately upon receiving shipping instructions. Read DA Pam 738-750 and DA Pam 738-751 so you will be able to complete an SF 368 when needed. Your DRs will affect future equipment, manuals, maintenance procedures and eliminate many recurring problems, *but only if you submit them.*

**Mr. Wolf Prow**
Threat Manager
U.S. Army Aviation Logistics School
Fort Eustis, VA

# THREAT and Aviation Maintenance

A NEW COURSE for aviation maintenance officers is taught at the U.S. Army Aviation Logistics School (USAALS), Ft. Eustis, VA. The new classes combine the contents of maintenance officer courses with the maintenance test pilot curriculum. The Maintenance Manager/ Maintenance Test Pilot Course (MM/MTPC) has not only a lengthy title, but also offers a new twist: a section on threat.

Why should this subject be of interest to maintenance officers? Most of the material about threat deals with weapons and tactics, and seems to be written for combined arms or combat support units. Maintenance and logistics activities have traditionally occurred in rear areas, and the real enemy in aircraft maintenance was thought to be corrosion. Also, the argument was that the advanced courses at the U.S. Army Aviation Center, Ft. Rucker, AL, or at other U.S. Army Training and Doctrine Command (TRADOC) schools provided all the threat information an officer would need. There was a growing realization, however, that maintenance personnel are targets in high-, medium- and low-intensity conflicts and that the maintenance crew is as much at risk as the brethren in the more glamorous combat and flying roles.

Threat instructions, as part of the professional curriculum, at noncommissioned officer academies or in advanced officer courses, are not necessarily up to date, not always taught by intelligence personnel and rarely geared to the purpose of the course.

The most cogent argument is the reality of a threat that does not respect distances, type of activity, or size or location in a so called rear area. Maintenance facilities are easily detected and highly vulnerable. Loss of the maintenance capability could tip the scales of battle and upset the best laid plans.

The USAALS seeks to redress the oversight of the past when the impact of enemy actions on maintenance and logistics was not a major concern. Now the questions of how to survive in battle and how to generate sorties in the face of great adversities have become critical.

The AirLand Battle concept envisages combat actions in rear areas and over great distances. The imminent separation of the USAALS from the Transportation Center

also calls for a closer adjustment with Army Aviation and consideration of threat as a real battle element. A 4-hour threat section in the new MM/MTPC provides relevant and up-to-date information specifically for ground crews and the combat services support elements. The argument that "we've heard it before" becomes shallow. Students begin to think of themselves in an environment in which the enemy is all around and in many guises; fuel, food, supplies, water and even mail may not arrive; equipment and spare parts may not work; new weapons cause heavy losses and serious damages; and confusion reigns.

The up-to-date threat portion at the USAALS is a first. This section on threat fills a long-felt need to keep maintenance officers and logisticians abreast with developments and the nature of the threat. The future will bring new challenges through revised tactics, changed parameters and new technologies. Maintenance will be affected by directed energy weapons, new munitions and also new ways to locate targets and establish battlefield priorities.

The mission-oriented approach of the USAALS has been highly successful. Students are delighted to have a subject that turns out to be meaningful and directly applies to future assignments. Threat training in TRADOC schools is a major undertaking. It has the objective of providing all graduates with a basic understanding of the threats affecting them. Hopefully, personnel and resources will be available to realize this objective in all TRADOC schools to reach all students.

The conclusion is inevitable that threat training must apply and that it is critical. The mission of the U.S. Army is to win wars. The USAALS pursues this objective and seeks ways to generate sorties at all times and under any adversity. The approach seems to be effective, but much work remains to be done.

Maintenance personnel must have a thorough knowledge of UH-60 Black Hawk aircraft systems.

# Aviation Unit Maintenance Operations in Combat

**Captain Thomas DeVine**
Captain DeVine was assigned to Aviation Officer Advanced Course 86-5, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

AVIATION UNIT maintenance (AVUM) units, conducting operations in future conflicts, must be prepared to provide continuous and effective aircraft maintenance support. This is necessary, considering the increasing reliance on high technology in aircraft systems, armament systems and aviation maintenance support equipment. Aircraft maintenance is increasing in importance. It will greatly impact on the combat effectiveness of aviation units in future operations.

To successfully support and maintain future combat operations, aircraft maintenance policies and procedures will require major adjustments. The basic philosophy of all aircraft maintenance and flight personnel must drastically change. The primary goal of the aviation maintenance program is to support continuous operations with enough aircraft to suc-

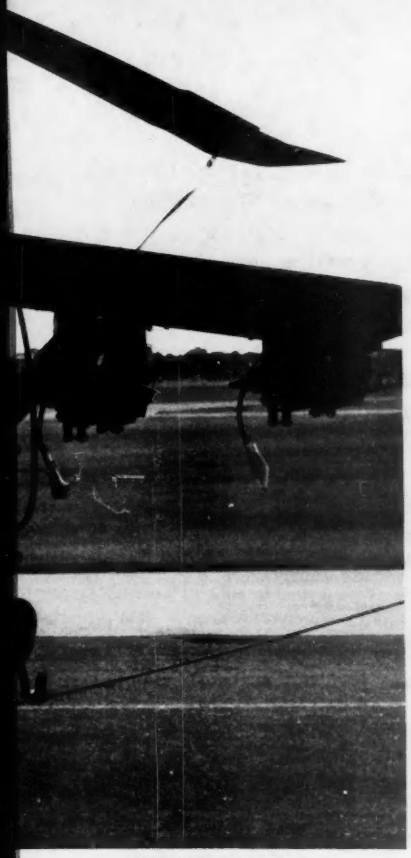


photo by SSG Columbus Frazier

cessfully support all mission requirements.

The cornerstone of a successful combat aviation maintenance program is based on the absolute requirement that all maintenance and flight personnel know their respective aircraft systems extremely well. Maintenance personnel must know how to make the *essential* aircraft and weapon systems function without always having the highly sophisticated, "nice to have" test equipment and special tools. A thorough understanding of systems, and how they operate, will allow maintenance personnel to use field expedient troubleshooting procedures for repairs.

Technical inspectors must shift their peacetime philosophy of returning aircraft to "like new" condition to a wartime, mission-oriented philosophy of producing reasonably safe, combat-effective aircraft. This may require quality control (QC) personnel to accept less than perfect, but still useful, parts, tolerances and maintenance practices and procedures. By knowing aircraft and weapon systems very well, maintenance and flight personnel can maintain a reasonably safe and combat-effective aircraft.

Massive numbers of flight hours are flown during combat; therefore, the supply system may be taxed to its limit to supply the needed repair parts to sustain aviation operations. This problem can be greatly decreased with the reuse of serviceable parts, packings, filters and hardware. This would require important serviceability decisions by the QC. We will not have the luxury of discarding reusable parts. In addition, an aggressively managed, controlled exchange (cannibalization) program could help offset supply shortages. The combat-damaged aircraft could be an excellent source of repair parts under this program. Also, many less critical inspections and services may need to be extended, overflown or eliminated to facilitate readiness. Unit test pilots may not be able to perform all maintenance test flights. This may require flight crews to do thorough maintenance operational checks and conduct limited test flights.

The AVUM headquarters and primary maintenance site will be located in the brigade support area. An ideal site for this operation would be a small factory, warehouse or any other "hard" site that can offer concealment, cover and the facilities to support 24-hour-a-day maintenance operations.

Small contact teams will go forward to accomplish maintenance as far forward as possible. A heavy contact team at the forward arming and refueling point could include avionics, armament, sheetmetal and QC personnel to complete minor repairs during refueling and rearming operations. This team could use float radios, "black boxes" and spare parts to troubleshoot and repair damaged aircraft. These contact teams should be supplemented with personnel from the aviation intermediate maintenance (AVIM) unit to help with repairs; assess damage and problems; and to determine at what level, and location, the required maintenance will be performed. Also, with assistance of the AVIM personnel, the contact teams will assess, plan, coordinate and conduct aircraft recovery operations.

One serious problem that exists within our new "J" series tables of organization and equipment (TOEs) concerns the lack of light vehicles within the AVUM platoon. The TOEs only assign one light vehicle to the AVUM platoon, which is not enough to support the transportation needs of the forward contact teams, class 9 (air) section, QC section and the platoon leader/platoon sergeant. Considering the distances between the brigade support area and the battalion combat trains, more light vehicles are required to support a highly mobile, 24-hour-a-day maintenance operation. When the new J series TOEs are reviewed and revised, at least three or four more light vehicles must be authorized.

Recently, many debates have occurred over the controversial issue based on the idea of converting the AVUM platoon to a service company/troop in the new J series TOEs. Originally, the AVUM organization was a platoon organic to the headquarters and service company (HSC). In this situation, the AVUM platoon, which accounts for about half of the HSC, has an authorized captain (platoon leader) working for a captain company commander. This brought cries for the formation of a service company.

Either organization can work effectively. Although, if the maintenance platoon remains a platoon, the maintenance officer must serve as a battalion special staff officer reporting directly to the battalion commander. The heart of adequate communication and support lies in the requirement that the service platoon leader must attend all command and staff meetings and planning conferences to facilitate good planning. Also, the maintenance officer must continually brief and update the battalion commander, S3, S4 and company/troop commanders of the overall aircraft maintenance posture. This close and continuous communication is required for successful aircraft maintenance support in future combat operations.

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IT IS A COLD early January morning in Germany. As you drive to the hangar for a 0900 mission, you notice that a couple of inches of fresh snow have fallen last night. You're not looking forward to that cold preflight, knowing that the aircraft is covered with snow and is usually parked out in the north forty.

As you approach your aircraft, you find that all the snow has been cleared off the machine. Your crewchief is busy with the Herman Nelson heater, melting the snow away from the pylon section. The aircraft is completely opened up, fuel sample taken and the logbook ready for your inspection. As you conduct your preflight, your crewchief follows behind you, answering your questions and closing the cowlings. Walking back to the hangar to complete the mission planning, you yell back and say "Hey Chief, have it ready to go in 30 minutes." Thirty minutes later everything is closed up, blades untied and ready to go.

Throughout Army Aviation, the crewchief has played a very important role. There is no special school for the sole training of a crewchief, except for the CH-47 Flight Engineer Instructor Course taught at F Company, 1/14 Aviation Regiment, at Ft. Rucker, AL. He comes to the unit as a school-trained aircraft mechanic, and is normally assigned to a maintenance team to develop his mechanical skills. When a mechanic is assigned to a flight slot, it is because he has been recommended by his supervisor as being above average. The soldier's performance has demonstrated that he is knowledgeable in his job and capable of handling the responsibilities of a crewmember.

What are the duties of a crewchief? It is more than just opening and closing the aircraft for preflight. He carries out the duties assigned to him by the pilot in addition to the following:

- Performs maintenance, servicing, inspection, loading and security.
- Performs the daily inspection and ensures all forms and records are current and correct.
- Assists the pilot with the preflight.
- Checks the security of each inspected area.
- Assists in seating and secures passengers and cargo.
- Clears aircraft during all starting operations.
- Observes and gives clearance to pilots during all hover and taxi operations.
- Monitors aircraft systems instruments and informs pilot of all inflight traffic.
- Operates and controls the use of the hoist and winch controls, directs the pilot over external loads and monitors the load in flight.

These are just a few duties performed by the crewchief. Chapter 8 of each aircraft operator's manual discusses these duties in more detail. Each crewchief should be thoroughly familiar with his duties as outlined in the operator's manual.

The crewchief is the first to arrive and the last to leave the aircraft. Normally, he arrives at least 1 hour before the scheduled preflight. This gives him time to remove the covers and open the cowlings. Sometimes conditions warrant an earlier show time, as in the above scenario, to remove snow or ice accumulation. At the end of the

mission day, the crewchief must conduct a daily inspection or perform a service. The aircraft must be secured and the logbook forms closed out before he is allowed to leave. All in all it means hard work and long hours. Remember there is no established crew rest policy for crewmembers other than what you decide in your unit.

The crewchief is a vital link in the aviation maintenance effort. His daily exposure to the aircraft allows him to have his pulse on the condition and mission readiness of his aircraft. He performs all required inspections and services, and he assists the phase team leader during the phase inspection. His efforts ensure the safe and continuous operation of the aircraft and needless loss of downtime.

What are the signs of a good crewchief? The obvious answer is his aircraft and all that is related to it. First, let's take a look at his logbook:

- Is the logbook neat, serviceable and complete?
- Are all entries on the DA Form 2408 series forms current and readable?
- Does the DA Form 2408-13 have a laundry list of discrepancies carried forward?
- Does the crewchief keep sufficient quantities of DA Forms 2408-12 and 2408-13 in the back of the logbook?

Now let's take a quick look at the aircraft. It is impossible to keep these machines looking like new, but it isn't impossible to keep them clean. A professional crewchief always will have a clean rotor head and tail rotor. The main rotor and tail rotor blades will be clean of all dirt, oil and carbon caused by engine exhaust. The helicopter's interior is clean, neat and organized. Seat belts are arranged for ease of use by passengers, and all flyaway gear is stowed and secured. The windows will be kept clean and highly polished.

A good crewchief will always be on time and ready for your preflight. Just make sure you, as the pilot, are on time also. It is no fun to freeze on a cold flight line waiting for your pilots to show up.

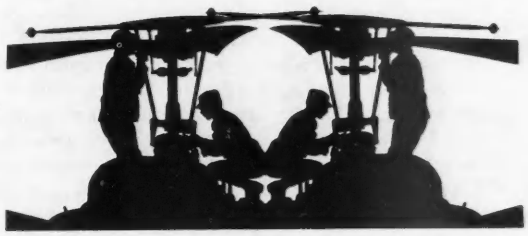
There are some things we as pilots can do to help our crewchiefs perform their jobs. First and most important is the maintenance operational check (MOC). Many of the inspections and repairs require the aircraft to be runup. Crewchiefs in almost all cases are not allowed to start aircraft engines. This means a crewchief must hunt down a pilot to start the aircraft if he is to complete the inspection. If your crewchief is performing maintenance that will require a MOC, make yourself available for the runup. He will appreciate it!

Next is the mission brief. Before each mission the pilot in command must brief the copilot on the mission. All too often we fail to include our crewchief on the briefing. He is part of the crew and needs to know what his special duties are during the mission. Be sure to include the estimated hours to be flown, estimated time for end of mission, special mission equipment, cargo and number of passengers and, in the case of war, any down aviator pickup points.

As I stated before, there is only one specialized school for crewchiefs. They are appointed at the unit, which means they must also be trained at the unit. First, you must identify when you are going to need a replacement crewchief. Request that your maintenance supervisors submit names of those mechanics they feel are ready for the job. Use skill qualification test scores, job performance and time in unit to help select a good prospect. Flight status is an incentive to good performance and should be treated as an award or job promotion.

Once you've decided on an individual, have him link up with the crewchief that is being replaced. This will allow him to learn about his new duties and the aircraft, and gain some supervised experience. These steps all help to lessen the problems of transitioning into a new job.

The crewchief is a valuable asset to the unit. His functions are instrumental to the success of Army Aviation. The history of crewchiefs goes back as far as the time when the Army bought its first airplane. The next time you yell "Hey Chief," add a little pat on the back with it; he deserves it.



# III/V HINDSIGHT

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YOU MIGHT SAY the writing was "on the wall" as I stood listening apprehensively in the commander's office. As he twirled the telephone cord between thumb and a finger, I glanced occasionally at the chalkboard marked with the hastily written names of all lieutenants in the attack battalion.

Apparently, I had entered soon after the conclusion of some "process of elimination" for all of the names had been lined out—except mine.

The suspense was killing me!

"I'm making you III/V platoon leader," the commander said even before the receiver met the dial. The heavy emphasis he placed on the word *making* stunned me. "Too late to try and wrangle my way out of it now. His mind's made up," I thought.

Most people familiar with the class III/V (III is petroleum, oils and lubricants; V is ammunition) platoon leader's job know it is one of the most (if not *the* most) often avoided jobs among the junior ranks of commissioned Army aviators.

I recalled how I had often pitied the outgoing "III/V guy" from my cockpit as he scrambled around his forward arming and refueling point (FARP). Little did I know that one day this day would come. The commander confirmed my wing-stripped flight activity category II (FAC II) status by saying, "I'm sure you know the job doesn't allow a whole lot of flying . . . it's a FAC II slot." To make matters worse, he reminded me of the battalion's upcoming trip to the National Training Center (that place of all places where class III/V platoon leaders are most pitied).

The temptation to rip the wings from my flight suit and lay them on his desk was almost uncontrollable. His behind-the-desk, sloppy handed salute prompted mine and I was out the door quicker than you can say "fuel them birds."

I'll always remember the night I sat down at my kitchen table with an open beer in my left hand and a pencil in my right. I took little consolation in the fact that for quite some time I would rarely have to count the 12 hours back from "bottle to throttle." As I filled out my support form, the *goals* block suddenly sat before me. I scrutinized it for a moment or two and lightly scribbled "survive."

A little more than a year later, I stood beside my replacement, breathed a sigh of relief and witnessed his shock upon learning that he was the next "to be pitied." I had survived a potential career-wrecker.

I sat down one day and tried to explain "how to survive" to the new platoon leader. That's when it dawned on me that I didn't really know. The truth of the matter is that no one comes out of III/V unscathed. I made mistakes. Many of them and some more than once. The key to survival is an understanding commander—one that realizes the frustration associated with the job, and recognizes that too often missions are well beyond your means. With a little luck, you'll accomplish them anyway.

I decided that the best I could do was lay down my fundamental rules for him.

These rules I had learned offered the best chance for survival.

**"Rule Number 1,"** I said, "is **Hit the books**." Soon after taking the platoon, my commander began asking questions that required me to possess more than a basic technical knowledge of my equipment and its operation. He also stressed the need for a firm grasp of the tactical employment of my platoon under AirLand Battle doctrine. The alternatives to educating myself were not attractive. Either I hit the books or kept my platoon sergeant in tow to answer the technical questions. I would also have to continue tapdancing around the doctrinal ones. I elected to hit the books and have my platoon sergeant set up a training program for me to learn to operate the equipment.

After handing my stack of publications to the new platoon leader, I proceeded to the next rule.

**Rule Number 2** is **Lead by example**. The average aviator-lieutenant often can relate to the young enlisted soldier only as the diligent crewchief who maintains his aircraft—no more—no less.

At the crucial point in his career when developing his leadership skills is so important, the lieutenant is isolated by the lack of a need to lead. The III/V platoon, I found, offers the leader an opportunity that is, unfortunately, rare in Army Aviation. He is given the mission and the opportunity to accomplish it with his platoon, independent of higher control. He plans, coordinates and leads.

The platoon can sometimes run itself and missions may even be accomplished. Only through the leader's direct involvement in setting work priorities, and in planning and coordinating, can maximum effectiveness be achieved, however.

Standing back and watching the process happen will not prove to be an effective motivator for the platoon. When the mission is big and resources (particularly people) are few, the last thing the platoon needs is another foreman. I won't soon forget the weight of a rocket box—and I still have my fuel handler's card.

**Rule Number 3** is **Develop your noncommissioned officers (NCOs) and rely on them.** The fast pace of today's aviation training geared for the even faster pace expected on tomorrow's battlefields often requires simultaneous refueling and rearming from several forward locations. The III/V platoon leader should have a desire to be present at all sites but simply won't be able to.

Here, peace of mind can be had only through confidence in thoroughly briefed, competent NCOs. Only the class III/V platoon leader can judge this confidence, and on taking charge of his platoon, should begin a continuous evaluation of his NCOs' strengths and weaknesses. He should counsel when appropriate since communication is key to developing trust and confidence in his NCO leaders. FARP operations are inherently dangerous and lack of confidence in the NCO in charge will rapidly age a young lieutenant.

**Rule Number 4** is **Establish teams, train teams and rely on your best**. Integrate new soldiers into an established team where they can train and learn as a member. The platoon leader and platoon sergeant should evaluate teams and rotate personnel between teams until the most effective combinations are determined.

Under high-pressure situations, never fail to use your best crews. As personnel depart, graduate the best candidate to the first team.

Finally, **rule Number 5** is **Emphasize motor maintenance.** One characteristic of all class III/V platoons or support platoons is the common battle to maintain equipment at higher levels of operational readiness. Platoons usually fall into one of two distinct categories, those using old, antiquated vehicles that break down often because they're old, or those having new vehicles (like the heavy expanded mobility tactical trucks (HEMTT)) that break because they're new and have "bugs."

Whatever the case, increasing vehicle readiness requires that the platoon leader develop a close working relationship with the motor officer. *Your* broken vehicle is, after all, *the motor officer's* broken vehicle.

A little mutual cooperation and coordination can go a long way in seeing to it that your vehicles are repaired and on the road to the next refueling site.

The motor officer also will be instrumental in training and certifying your drivers. Indirectly, he greatly influences your platoon's ability to accomplish its mission.

The tendency for a soldier to perform preventive maintenance checks and services (PMCS), as well as the quality of the PMCS, is directly affected by the type of supervision present while they are conducted. Weekly command or platoon motor stables are a must. Motor stables conducted with the platoon leader and platoon sergeant absent might as well as not be conducted at all.

Often training or garrison commitments complicate a scheduled maintenance period. PMCS simply has to be conducted. Leaders should show flexibility in vehicle scheduling and work schedules to ensure that maintenance is accomplished.

A little *ingenuity* can sometimes decrease maintenance or inspection times. There's usually a more efficient approach to performing maintenance. The trick is finding it. In my platoon, for example, we consolidated the before, during and after operations checks into a more manageable checklist form. At that time the operator's manuals for the M900 series HEMTT were consolidated into one easily weighing 5 pounds and having at least 1,000 pages.

Once a soldier had demonstrated an understanding for what each item on the checklist corresponded to he was free to use it.

Short of these few words of advice, there was little I could do to ease the new lieutenant's transition to the class III/V platoon. But then again a little advice was better than none at all.

I wished him luck (you *need* it to survive) and was out the door—quicker than you can say, "Gotta go preflight. I'm flying today!"

# Toward a More Efficient and Effective Aircraft Maintenance Program

**Captain Philip Fine**
Captain Fine was assigned to the Aviation Officer Advanced Course, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article.

AIRCRAFT MAINTENANCE has long been avoided by most aviators because of a false perception of its complex and time-consuming nature. The job can be complex and time consuming if the maintenance officer does not plan ahead and use his common sense to accomplish his mission. This article outlines but a few of the more common methods of running an efficient and effective maintenance operation.

All too often, the commander turns out to be a maintenance officer's biggest stumbling block. Many commanders feel they must get as many flying hours as possible to complete training requirements. This is great for the pilots, but only to the extent that the maintenance unit and supply lines can handle the hours.

As maintenance officer, you must be able to plan ahead given the flight hour program and upcoming events. If your maintenance unit cannot keep pace with the flying hours, you must advise the commander. To maintain your credibility, have all of the facts ready before you request any cut in flying hours.

A commander must balance maintenance and training to have an effective training program.

All too often unit maintenance officers, in an effort to get fast service from the support unit, will sport a chip on their shoulder with aviation intermediate maintenance (AVIM). This is probably the worst thing they can do. Diplomacy and cooperation can pay great benefits far down the road. A good working relationship with AVIM can mean shorter maintenance turnaround time.

Efficiency in production control can directly affect aircraft maintenance. If production control doesn't have a computer, every effort should be made to obtain one. The laborious tasks of recordkeeping and reporting can be accomplished more efficiently with a computer, leaving more time for work order processing and prioritizing.

Mention split shift maintenance operation and you'll get one of two reactions—either for or against. Split shift operations can be a very manageable and effective method of improving the turnaround time on an aircraft in maintenance. With cooperation from the chain of command; i.e., reduced extra duty requirements, manning a split shift should pose no problems.

What do I mean by split shift? Break your maintenance platoon in half by military occupational specialty or section. The first half, A team, pulls its shift from 0700 hours to 1700 hours. The second shift, B team, works from 1600 hours to 0200 hours. This overlap of at least 1 hour is necessary to make a smooth transition from A team to B team.

With a consistent supply of parts, this method can reduce the time it takes to repair an aircraft by 25 to 50 percent. Unfortunately, the supply system is a major factor in how effective this system will be.

The timely arrival of repair parts is key to the rapid repair of aircraft. Too many times a needed part is overlooked and not discovered until near the completion of a service or repair. Discussion here will be limited to scheduled repairs because there is no method for forecasting parts for unscheduled repairs.

Depending on a unit's flying hour program, a parts inspection point must be established for scheduled maintenance. For example, on a phase the aircraft should be given a thorough and complete inspection about 25 hours before the phase. This will give the supply system a chance to process and deliver a parts request for time between overhaul, finite life or other needed parts.

Should a needed part be stocked in the unit prescribed load list, it should be removed from stockage and tagged for the specific aircraft, thus generating a demand for the part.

These are but a few of the commonsense things that can be done to make an aircraft maintenance unit more effective.

Aircraft maintenance is a very challenging job. By using common sense and a little imagination, we can avoid the long frustrating hours and low-readiness rates that less prepared officers face.

# USAASO SEZ

# NOTAM UPDATE

**Mr. Walter Perron**
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IN 1972, THE U.S. Air Force proposed to the military services and the Federal Aviation Administration (FAA) the development of a single U.S. notice to airmen (NOTAM) system. There was strong support for a consolidated system. After numerous conferences it was determined that the equipment and software were not available to support a U.S. NOTAM office. The Army then elected to participate in both the civil and military NOTAM systems. With the advent of enhanced computer technology, and because the Air Force central NOTAM facility equipment was antiquated, the proposal for a consolidated U.S. NOTAM system resurfaced. A series of Department of Defense (DOD)/FAA meetings were held in 1984; all parties agreed that a consolidated system was feasible. FAA/DOD system integration is progressing with an anticipated phase I completion date of 30 November 1988.

Several actions have initiated concerning NOTAMs that affect Army airfield operations aviators. These are—

- Each airfield listed on the summary or update will have the four-letter identifier printed in front of the airfield's name. For those airfields without a four-letter identifier, just add "K" to the front of your identifier.
- Special notices on the European Summary, Caribbean Summary and Pacific Summary are no longer in a special notice section, but are intermingled with country and station NOTAMs. They are listed alphabetically according to the location given to Air Force Central NOTAM Facility by the international NOTAM's office.
- Those bases that transmit NOTAMs are now required to send them in International Civil Aviation Organization formats using NOTAM codes.

***How will the combined FAA/DOD NOTAM system operate?***

The FAA will operate the U.S. NOTAM Office (USNOF) with each service providing a liaison noncommissioned officer to assist with DOD unique criteria. NOTAMs will be transmitted through a central computer in Kansas City to the Carswell AFB, TX, Air Force Weather Network. The computer at Carswell AFB will then transmit the information on CONUS meteorological data system (COMEDS), European meteorological data system, Pacific meteorological data system or Caribbean meteorological data system.

***How does operations disseminate or receive NOTAM information?***

Several methods may be used as follows:

- Send and receive via message through base telecommunications centers. Message address to be published in Technical Bulletin Aviation 1—Flight Information Bulletin (FIB).
- Send and receive through another base that has COMEDs equipment. Letters of agreement should be developed between the appropriate facilities. If the only way to receive a NOTAM briefing is via telephone, instructions should be displayed in an accessible location for all aviators.
- Send direct to USNOF via AUTOVON. Number will be published in the FIB when the line is installed. Follow up with a message. This procedure is to be used as a last resort.

***How does the aviator obtain NOTAMs?***

Until phase II aviator request is completed, the aviator will still be required in most cases to obtain NOTAMs off both the military and civil flight service station systems.

For DOD airfields and heliports with a diamond in the flight information publication, the military NOTAMs will suffice.

For joint use or airfields where the military is a tenant, the aviator will have to query two systems.

Aviators without access to the military NOTAM system (COMEDS) contact the FSS and ask for NOTAMs for the appropriate DOD facility or facility with military tenants using the appropriate four-letter identifier (if the identifier is a three-letter identifier, add "K" to the front). Then to receive the civil class "D" NOTAMs on all but DOD only facilities, make the same request using the three-letter identifier.

*USAASO invites your questions and comments and may be contacted at AUTOVON 284-7773.*

AIRCR T